THE SURVEYOR, ENGINEER, AND ARCHITECT;

OR

LONDON MONTHLY JOURNAL OF THE PHYSICAL AND PRACTICAL SCIENCES

IN ALL THEIR DEPARTMENTS.

BY A COMMITTEE OF PRACTICAL SURVEYORS, ENGINEERS, AND ARCHITECTS, OF MUCH EXPERIENCE AND IN ACTIVE EMPLOYMENT.

ROBERT MUDIE, LITERARY CONDUCTOR.

ON THE ESTABLISHMENT AND IMPROVEMENT OF CEMETERIES.

THE decent inhumation, or some other means of disposing of the remains of the dead, has been among the earliest indications of civilization in all ages and in all parts of the world. It has very generally been more or less blended with the religious rites of the people; and where those rites have been superstitious or cruel, it has partaken of the one or the other, affecting of course the living and not the dead. The generation, whom any one generation lay in the dust, or otherwise dispose of according to the established observances, in the ordinary course of nature, are the immediate instructors of those who perform these last rites to their cold and unresisting remains. But the course of nature runs varied in this respect, and the infant is cut off at the dawn of life's morn, the youth during its advance, the strong at its full meridian, and the mature in experience at every stage of its decline, until at last, a small remnant only is left to be borne to the grave at the stilly close of life's evening twilight. Accompanying this great variety, there is equal uncertainty, and though hope lingers by the couch of disease, as long as the connection between body and mind leaves a single wandering gleam of thought, yet no human being can assure himself that the day or the hour may not be his last. This produces a sort of religious feeling for death, and a veneration for the remains of the departed, and even for the place of their final repose after the destroyer has disjointed them, bone by bone, and the fragments are mingling with the mould, particle after particle;

> "For who, to dumb forgetfulness a prey,
> This pleasing anxious being e'er resigned;"

and this is the true reason why the disposal of the remains of the dead has been so frequently linked with religion, and why the grave has impressed natural feelings of a future state upon the thoughtful of mankind, long before "Life and Immortality were brought to light by the Gospel."

In an abstractedly philosophical point of view, it is of small consequence where the remains of the dead are buried, or how they are otherwise disposed of; for He who at first formed the human body of the dust of the ground, can call it back to organization and to life, even though all its particles were wider than the solar system apart. But abstract philosophy is not feeling; and this is a subject the moral value of which lies in softening the hearts of men more than in enlightening their understandings. This is the grand reason why, in every Christian country, the burial of the dead is more or less a religious observance; and, within such limits as to exclude superstition, it is proper that this should be the case; because mankind are never more apt to think more strongly and aright upon their own latter end, than when the effects of the latter end of another are brought immediately before them in palpable reality. For this reason it appears, in great part at least, to be that the dead continue to be buried in churchyards and in churches. We doubt the propriety of the latter mode under any circumstances, and regard for the living, as well as respect for the dead, must regulate its propriety in every case. In thinly peopled districts, where the church stands freely exposed to the breezes of heaven, we think the churchyard, with its grassy sods and simple monuments, a most appropriate, and even instructive appendage to the house of prayer; for the people may take a wholesome moral lesson, by meditating among the tombs, while they wait for the commencement of the service. But, in crowded cities and towns, and even within their precincts, whether the immediate spots may be crowded or not, the case is very different. Inhumation there is unseemly as respects the dead, and offensive to feeling in so far as the living are concerned. It may even be far worse than this, for the treatment of the dead may be revolting, and the effect on the living highly injurious to health. In the Metropolis, many of the churchyards are thoroughfares, and the relatives of the dead have to stud their flat monumental stones with large headed nails, in order to preserve their names a little longer from being obliterated by the trampling feet of heedless passengers. This is not calculated to promote respect for the dead, or to turn the grave into a subject of useful meditation. In other Metropolitan churchyards, and, it is the same in most old and crowded towns, the state of things is worse even in the cases of those inhabitants who were deservedly respected while alive. The extent of ground bears so small a proportion to the numbers who are buried in it, that, during the lives of the immediate descendants of the dead, their bones, as yet quite undecayed, are tossed about by the shovels of the grave diggers, as if they were mere inorganic matter. If there were but a solitary instance of this once in a number of years, it would be regarded as an exceedingly offensive display; but the frequency of it takes off the offensiveness, and, of course, destroys the becoming respect for the dead, and the wholesome moral lesson which ought to arise out of that. We have learned, however, that there have been, and are even now, within the Metropolis, scenes so much worse than these, as to be utterly revolting, even to those who have not much moral feeling. They happen chiefly to the poor and the destitute, at least to their remains, when death has placed them on the same level with those of the most wealthy. In some crowded parishes, the churchyard can afford no room for the remains of these, and their surviving friends are unable to afford grave clothes, coffins, and the other requisites of decent sepulture. In consequence of this, a vault is provided to which the dead are carried in shells let out at very small hire, and there the naked bodies of men, women, and children, are tumbled into a heap, where they rot promiscuously in an atmosphere of the most pestilent description. They are flung down stratum super stratum, beginning at the distant part of the vault and terminating toward the entrance, so that there are bodies in all stages of decomposition, from the bodies at the distant part of the bottom to the recent dead near the entrance. We shall not name the place, nor our informant, though he is now mouldering in the grave himself. He was an anatomist; and as, during the zenith of his professional career subjects for demonstration had generally to be obtained by stealth, he procured a considerable number from these dungeons of corruption. When a man, however eminent his talents may be, is forced to descend to illegal practices in order to procure materials for scientific operations, he is under the necessity of employing agents of the lowest character. One night between Saturday and Sunday, those whom he employed had quarrelled with the keepers of the dungeon about some subjects which had been cast into it on the preceding day; and the keepers contrived to lock the agents in, and left them there till the dark hour of the following night, in a situation the most revolting to human nature. There were, and there may be still, several places of this description in the crowded parts of the British Metropolis, though we, of course, have no personal knowledge; but, we have heard that a considerate churchwarden, anxious for the health of those who plied, as necessity required, in the dungeon alluded to, caused a perforation to be made through the wall into an adjoining lane, but the vapours that escaped were so intolerable, that the aperture had speedily to be closed. There must be much of this pestilent vapour floating in all neighbourhoods of places in which the process of human decomposition goes on rapidly, and therefore, burials, even though decent in appearance, ought to cease in such places. One means, though a comparatively recent one, of bringing about this desirable result is, the establishment of rural cemeteries at some distance from the crowded dwellings of the living. Jews, Turks, and men of many other creeds, have had such cemeteries for long periods of time; and several public ones have existed for a good many years, among nations of Christian Europe, even where prayer for the dead is an

injunction of religion, and, therefore, where interment in or near the church should seem to be more consistent than in this country, where such prayer is regarded as superstition, if not as downright idolatry. But, notwithstanding this, decent cemeteries are of comparatively recent introduction in England; and, in the neighbourhood of the metropolis especially, they have been projected as mercantile speculations, and executed under the sanction of acts of parliament, chiefly with a view to pecuniary profits; and, in some instances, with the same kind of jobbing as has been but too characteristic of the establishment of other joint stock projects.

Notwithstanding this, these cemeteries, generally speaking, are decent places for the dead, in the cases of all parties who can afford to pay for them. They do not, however, tend to remove the worst part of the evil, that of the indecent disposal of the remains of the poor. In order to do this, there ought to have been a little system introduced whereby the proprietors of every cemetery should have been bound by their act of parliament to set apart some fraction of their ground for the decent and gratuitous inhumation of the poor. This has not, in so far as we are aware, been done in the case of any of those hitherto established, and it seems now too late to introduce it, especially in the metropolis. We must, therefore, take them as they exist; and we readily admit that they are great improvements on the old system, though not so great as they might have been, had they been established with perfect knowledge of, and an honest desire to promote, the best interests of the public.

SOUTH METROPOLITAN CEMETERY, WITH ELEVATIONS OF THE TWO CHAPELS.

The South Metropolitan Cemetery at Norwood occupies an extent of upwards of forty acres, and commands, probably, the most beautifully diversified prospect that can be obtained in any situation at the same distance to the south of London. Its entire distribution and arrangements, general as well as architectural, have been completed under the professional superintendence of Mr. Tite, as architect to the Company under whose care this cemetery has been established. The site in question has its centre and southern portion elevated in a commanding knoll, which naturally suggests some of the principal circumstances of distribution, such as the position of any buildings that may be required as chapels, the forms of roads or paths best calculated to afford gradual and easy access to those buildings, as well as to give an available division of the ground for the purposes of interment, and, lastly, the subordinate ornament to be derived from plantation in accordance with the forms resulting from these necessary lines of arrangement. Provision was also to be made for that separation of the dead which, however invidious it may appear at first sight, is, under existing circumstances, unavoidable; since, while the general preference is given to the use of such burial-places as have been set apart to their purpose by consecration, according to the usage of the episcopal church in all ages, it is still neccessary to meet the wants of many who choose other functionaries and other rites than those of that church, and for whom, consequently, the consecration of any site would be a mere act of officiousness. Upon these considerations, therefore, have been determined the leading points of arrangement in the cemetery in question. About two-thirds of the land, to the southward, are consecrated, leaving the remainder, to the northward, for the use of dissenters; while the rising ground suggests not only the situation but the aspect also of the necessary chapels, the Episcopal to face the west, and the Dissenters' the north. These points, together with the principal entrances, and general lines of access, having been arranged, the architectural style decided upon was the Gothic of the class frequently designated Perpendicular, or, in general terms, that of the fifteenth century in this country. In this style accordingly are all the erections proper to this cemetery, comprehending a massive boundary wall, with principal entrance, gateway, and lodge attached to it, two gateways of inferior importance, and two chapels, with a range of monumental arcades to each, and extensive catacombs beneath.

To notice these component portions more in detail, we may observe, that the principal entrance, which stands at the north-west angle of the ground, consists of a large archway for carriages, flanked by a smaller for persons on foot, both being furnished with massive cast-iron gates of open tracery. These archways are appropriately decorated with spandrels of tracery, containing shields, the great gate being farther surmounted by the armorial bearings of the province of Canterbury and see of Winchester, besides a scroll inscription on the exterior. The character of this composition is good, but would have been greatly improved had the whole been introduced in the midst of a length of wall, instead of being flanked on one side by nothing more substantial than iron railing, which is here, and in some other places, introduced instead of the general solid wall, to give publicity to the prospect. The railing, however, is of a solid as well as ornamental character, cast in large panels, strengthened with massive standards, and with large piers, at given intervals. The boundary-wall which continues the enclosure, is of the height of 12 feet, divided by piers into bays of 30 feet in length; the inequalities in the surface of the ground being met by "jumps" in the entire bay, without deviation from horizontal lines. This wall, which is nearly a mile in length, is in brick, with the decorative parts in Portland stone, the latter comprehending plinth-courses, copings, embattled pier-caps, &c. It may here be observed, generally, that all the other buildings have their plain portions faced with white brick, with the ornamental and moulded details in stone.

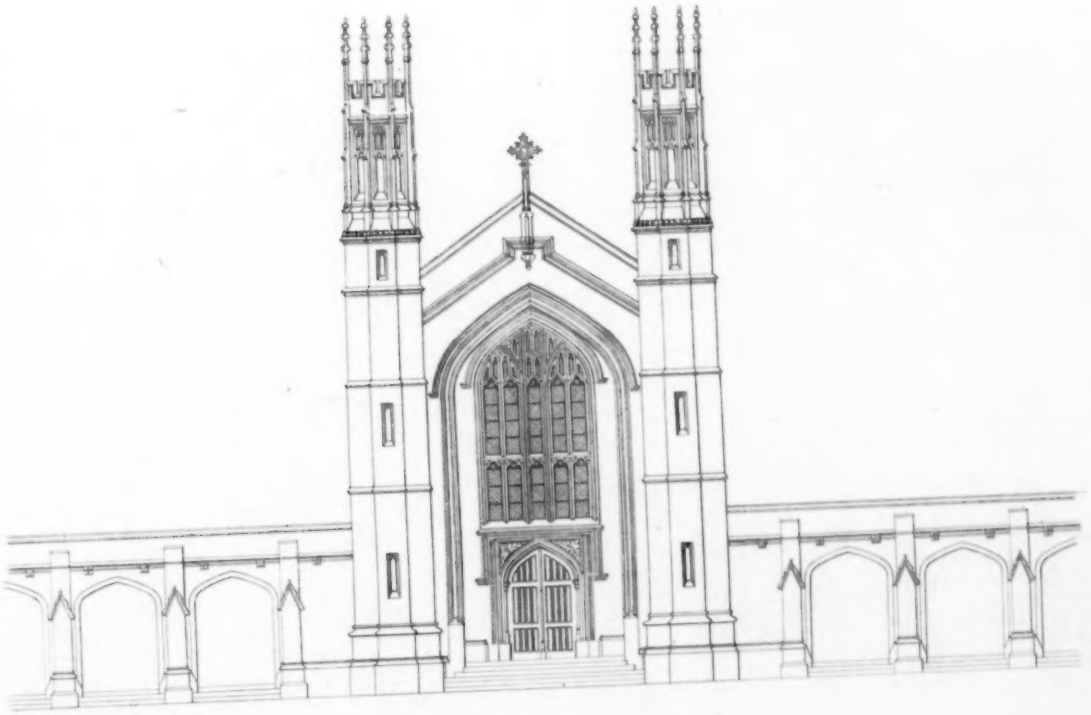
The lodge attached to the principal entrance contains an open porch, an office for the use of directors, and other local purposes, and domestic accommodation for the superintendent. Square-headed windows, of three or four bays, projecting gables with barge-boards, tall clustered chimneys, and similar features, sustain the cottage character in this building, happily without any intermixture with the pretty barbarisms of the modern Tonbridge-ware school of rustic architecture. To proceed, however, into the cemetery, the principal objects that we have to describe are undoubtedly the two chapels. The Episcopal chapel is a parellelogram, in external dimension about 75 feet long, 32 wide, and 52 high. Its western or entrance front is marked by a deeply-recessed vestibule, within a lofty open archway, flanked by two octagonal turrets, each of which is terminated by a light pierced lantern. The vestibule displays a boldly ornamented doorway, with enriched spandrels, a large five-light window above, and a groined ceiling, with diversified bosses of foliage, &c. To the eastward of this vestibule, the flanks of the chapel are divided by buttresses into five bays, each occupied by a lofty window, two lights wide and high, with a highly enriched head. The eastern front is marked by a large window, very similar to that at the opposite end, and has the angles fortified by buttresses, well grouped, and terminating in chimney-shafts, the introduction of which is happy, and incomparably more consistent with architectural propriety than is the miserable subterfuge resorted to in not a few of the modern churches, where iron funnels are seen protruding from the parapets and gables.

From the entrance vestibule extends a covered walk on each side, north and south, at right angles to the body of the chapel. These ambulatories are open to the westward, with five plain arches in each, separated by buttressed piers, but are for the most part closed at the back or eastern side, being intended for the reception of mural tablets and the like. Passing to the interior of the chapel by an entrance lobby, communicating with a vestry on the one side, and a staircase to the catacombs on the other, we find the arrangements strictly those suggested by the objects of a sepulchral chapel. Handsome desks of open work, elevated upon a flight of steps, for the clergyman and clerk, occupy the situation usually allotted to the communion table. Two lines of massive seats are ranged along the north and south sides of the chapel, the walls above them being decorated with elaborately-finished panelling, to the height of the bottoms of the windows. Above this line rise shafts, from which spring arches and spandrels of tracery above the windows; and from corbels again rise transversely the members of the ceiling, which is formed in imitation of a system of panelling in two inclined planes, having the rib-mouldings of oak, and the intervals coloured grey, the tie-beams passing through beneath, rising from curved springers with open carved spandrels. In the centre of the chapel, covered with appropriate drapery, stands a lowering table governed by an hydraulic apparatus, which is used for the deposit of the coffin, whenever an interment takes place in the catacombs beneath.

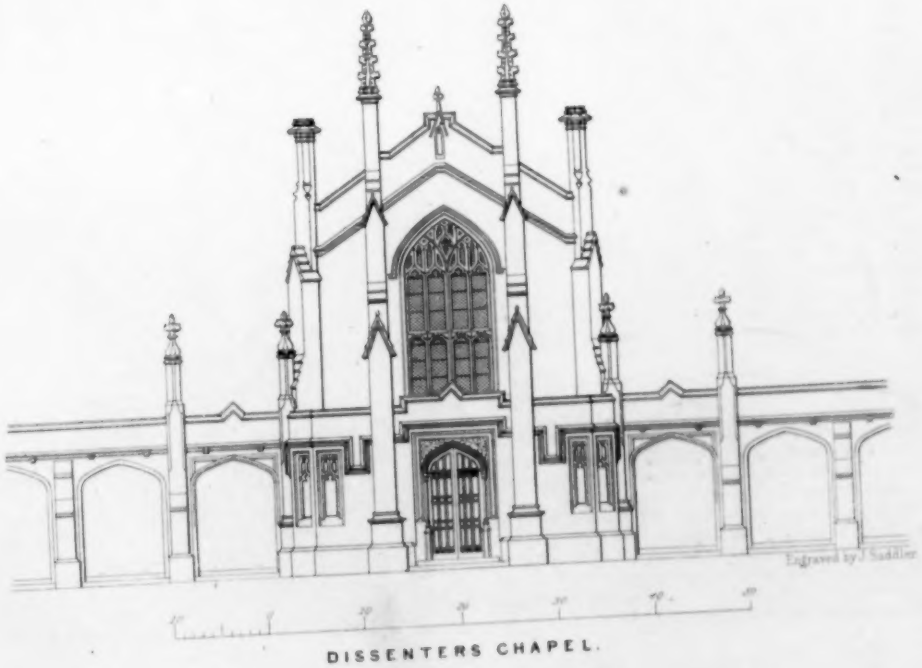
The general arrangements of the chapel for the use of dissenters are very similar to those just described. This chapel likewise is a parallelogram, and is externally about 73 feet long, 30 feet broad, and 46 feet high. The entrance front is formed into three com-

SOUTH METROPOLITAN CEMETERY NORWOOD.

W. TITE, ARCH.T F.R.S. F.G.S. &c.



EPISCOPAL CHAPEL.



DISSENTERS CHAPEL.

London Published for the Proprietors by Grattan & Gilbert, 51 Paternoster Row Sept.r 1.1840.

partments, vertically, by massive buttresses terminated with pinnacles, the angles also being flanked by buttresses finishing in chimney-shafts. The lower portion of this front advances from the main body of the chapel, thus affording room for an entrance lobby between a vestry and a staircase to the catacombs. In the centre above is a large four-light window. A covered way, or arcade, extends to the right and left of this entrance, very similar to that which is attached to the episcopal chapel. The flanks of this building are also divided into five bays, each occupied by a two-light window of good proportions; while the back, which is comparatively removed from observation, is successfully relieved by the introduction of a niche in the midst of a pattern of party-coloured brickwork, in the old lozenge style of design. The interior of this chapel is very similar in arrangement to the former, but somewhat simpler. A screen of open work, of plain but chaste character, cuts off a portion of the body of the chapel at the entrance, from which access is provided by side doors to the arcades; the view at the opposite end is terminated by a handsome pulpit, occupying the centre of an arched recess.

Such is a general description of the principal features of these buildings, to which we have endeavoured to give additional illustration by the annexed elevations. These elevations, however, were they more elaborately exhibited than they are, would necessarily give but a disadvantageous representation of the originals, from the formal and geometrical delineation of the parts. The similarity between the distribution of the two frontages of chapel and arcade is, in execution, open to some objection, occupying, as these buildings do, situations so nearly equal in importance, and in such close proximity to each other. It must be confessed, however, that a material alteration for the better in the effect of these structures, must be expected to result from the help of nature, after a few years shall have brought surrounding vegetation to greater maturity, and destroyed that obtrusive rawness and formality which must necessarily characterise all such works, when just fresh from the hands of the builder and the nurseryman. The natural attractions of this spot are indeed pre-eminent; and they have happily been improved by the Directors of the undertaking, with the liberality of men anxious to do justice to an important public work, rather than with the calculating spirit of joint-stock speculators. In the choice of an architect, they have had the judgment to select one who should at least be incapable of putting up any such abortions as the greater part of the pretended Gothic architecture of the day consists of; and the result of their selection has been, that they have obtained a cemetery incomparably before any cotemporary works of the same class around London, in point of architectural merit. One circumstance attending the judicious treatment of the Gothic style, in situations like the present, deserves especially to be remarked, which is, that the forms developed by it in its archways, avenues, bays, and mullioned lights, afford the most admirable frames and foregrounds to the diversified pictures of nature. Through such openings, on looking out in different directions from the chapels and arcades which we have described, the surrounding landscape is seen in an endless variety of grouping and effect, which it would be difficult, if not impossible, to obtain in any other style. To do justice to a work of this kind, however, demands a much greater expenditure of professional labour and attention than most architects are prepared to bestow; and we are happy to confess, that in the instance before us, there is no one member of these extensive compositions that does not bear the evidence of such attention. The interiors of the two chapels are the parts upon which the effect is principally concentrated, as must be the case in all similar structures that deserve the name of Gothic. In both, there is an unencumbered amplitude and loftiness of proportion, a just application of ornament, a correctness of detail, and a solidity and fitness in the accessories, which preserve the unity of character to an extent rarely maintained in modern church architecture.

But upon this subject we have, probably, carried our remarks, both adverse and favourable, to a sufficient length; and, for any farther satisfaction of their curiosity, we therefore leave our readers to the exercise of their personal observation. For our own part, so far as it may be possible to wish well to such a receptacle for the dead, without injustice to the living, we give its conductors the benefit of our suffrage. This we are yet the more inclined to do for two reasons, which we will just mention in conclusion: the one is, that we find in the cemetery at Norwood nothing that can associate in our imagination the repose of the grave with the wantonness of the tea-garden; the other, that, up to the present time, this spot has been preserved free from any of those monumental abortions, as abhorrent to right feeling as to good taste, by which the tribute of memory is converted into mockery, and condolence too closely attended by contempt.

TRAFALGAR SQUARE AND THE NELSON MONUMENT.

The "Report of the Select Committee on Trafalgar Square" is so interesting a document, connected with matters of architectural taste, as to call for a full notice from us; more especially as it enables us to bring forward a subject which we have not, till now, had any suitable opportunity of noticing, for the reason that the circumstances themselves took place before our journal was started; — we mean those of the two competitions for the Nelson Monument. We will, therefore, as regards this latter, begin to speak of it *ab initio*, because all that is said about it in the Report is confined to inquiring how far the site selected is a judicious one, both as regards the intended structure itself and its effect upon the square and the surrounding buildings.

The announcement of an unlimited competition for the Nelson Memorial excited very great anticipations, for not only was the subject itself one that afforded or seemed to afford ample scope for originality of design and artistical display, but the competitors were left entirely to their own ideas, without restriction at all, except as to maximum of cost; they being, in all other respects, perfectly unfettered — at liberty to make their designs exclusively architectural or not, and that without limitation as to style or any thing else: in short, they had perfect *carte blanche*, without even a shadow of any of those *sine qua non* conditions which almost invariably bind down the artist on all other occasions of the kind, and prevent him from soaring beyond their sphere. Here ample space was afforded the competitors, for soaring to the utmost verge of their imaginations; they may be said to have been in the condition of persons sent up aloft in balloons, but, unfortunately, without any ballast, or without knowing which way to steer their course. They may truly be said to have been *uninstructed*, for instructions they had received none. From the very first, therefore, we entertained very great misgivings as to the result; although we were not prepared to behold such barrenness of invention as manifested itself either in the stale common-places, or the preposterous extravagances, which constituted so awful a majority of the designs sent in at the first competition; — to say nothing of the bewildering chaos the exhibition itself presented, there being no attempt at classification, and the models and drawings themselves being of all dimensions, and upon every variety of scale. Classification we must admit would have been an exceedingly laborious, or rather a hopeless task, many of the designs being altogether *sui generis* and nondescript things, till then unattempted or unimagined; nevertheless, contradictory as it may sound, without a particle of originality in them. Indeed, there were some half-score that appeared to have issued from St. Luke's — not from the academy, but from the mad-house, so called. How they came to be exhibited or even received at all, is to us quite inexplicable; for such productions — some evidently enough by persons who never touched a pencil before, and who were not fit to be trusted with designing a sign-post, ought to have been treated as intentional insults.

Little, therefore, did we wonder at, and we almost excused, the decision of the Committee, when we found that they had awarded the highest premium to Mr. Railton; because, although most common-place in itself, his design was at least honest, unsophisticated common-place, without the slightest attempt at invention, or even novelty, a most decent and respectable piece of second-hand classicality; while its mere negative merits were made to appear positive ones, at least in the eyes of such persons as the Committee was composed of, by the careful and tasteful execution of the drawings, whose pictorial beauty was self-evident, especially when set off by so many wretched things, even as drawings, among the other designs upon paper.

Neither the competitors, however, nor the public, were satisfied

with the choice determined upon, it being thought, and very justly too, that the world would expect to behold some nobler and more original proof of English talent, on such an occasion, than a mere piece of mason's work, a huge Corinthian Column, with a few petty ornaments at the lower part of its pedestal. The Committee accordingly consented to throw open the competition again; yet, without giving any kind of warning, or intimating, as from the result it now appears they ought to have done, that they were, nevertheless, very strongly prejudiced in favour of Mr. Railton's design, and, at all events, considered that something partaking of the column form, in regard to slenderness and loftiness, would best meet their views. It may, perhaps, be said in excuse for them, that such warning was superfluous, since their first choice would naturally lead those who intended to compete again, to such conclusion. Still it would not have been amiss had they been a little more explicit on that point; because, after precisely the same result again, in favour of Mr. Railton's design, it looks very much as if the second competition had been granted merely with the view of seeming to yield to public opinion, while the Committee themselves were determined to adhere to their first decision. At all events we conceive that finding themselves awkwardly driven into their former position, they were, in common decency, bound to justify their choice, both to the competitors and the public, by giving to the world the reasons which had finally led to such choice. Instead of which, reasons were not allowed to have anything to do with the question; for it appears that the collective wisdom and taste of that Committee resorted to the more expeditious and less troublesome mode of settling the question by BALLOT!! consequently we do not even know to whose superior discernment and taste it is that we are indebted for the choice of a design manifesting such extraordinary effort of imagination.

In the evidence taken before the Select Committee, the merits of that design are not touched upon, the question regarding the column being confined to the consideration of the site fixed upon for it. We, however, shall take the liberty of here bringing forward what appear to us insuperable objections against such kind of monumental structure. As far as general form and proportions are concerned, a slender lofty object, if an architectural one is to be adopted, most undoubtedly recommends itself for the purpose; but, then, it should be an independent one, complete in itself, and expressly designed for its particular purpose; not a mere borrowed fragment—an unmeaning copy of what has meaning only with reference to other parts essentially connected with it, and apart from which it becomes no more than a single limb cut off from a body to which it evidently belongs. In itself, therefore, a single gigantic member of the kind is no better than a puerile *monstrosity*, an enormous pedantic blunder, a wholesale solecism contravening all sound æsthetic principles:—in short, not less absurd, though not altogether so barbarously ugly, and so palpably ridiculous, as was the *design* sent in by Mr. Foggo, which was neither more nor less than a huge mast, to be stuck up in the centre of Trafalgar Square. And yet, even that truly preposterous May-pole affair was at least free from one exceedingly great objection attending any colossal column, because, at all events, there was nothing architectural about it, consequently, there was no danger of its provoking any sort of comparison between itself and the surrounding buildings, prejudicial to the latter; whereas, a colossal Corinthian column must have the effect of making those of the porticos of the Gallery and St. Martin's Church appear absolutely dwarfish: it will look like Gulliver among the Lilliputians, or like a Brobdignagian surrounded by Gullivers; though the first comparison is the more apposite one, because it will be a veritable Gulliver begulling, or showing how easily the public are gulled in matters of taste.

It will, perhaps, here be objected to us that, after all, it is entirely matter of taste and opinion: shall we say Yes? If so, we may as well take a step farther, and, instead of stopping short just there, say once for all, that matters of taste are entirely matters of whim. Such honest and legitimate conclusion would include and conclude every thing; would effectually settle not only the present, but every future argument of the kind; would, in short, give the *quietus* to criticism. Luckily it does suit our purpose to make such quick work of it; we say, luckily, because we question whether those who may most dislike our arguments on this occasion would care to get rid of them on such terms. Looking only to the present instant, it might be a very desirable and convenient conclusion; yet, one most inconvenient and disagreeable in its consequences, even fatal. We shall, therefore, proceed with our objections, and, by so doing, may possibly call attention to the other circumstances; which have not hitherto obtained the attentive consideration they deserve. We hear, indeed, a very great deal about abstract principles and qualities, about proportions and matters of that kind; notwithstanding which, we rarely observe any intelligent application of them, any discreet modification of them according as the particular care may require. Instead of principles to be applied discriminately, we have established a set of rules to be got *by rote*, and applied without any discrimination at all, in cases requiring quite a different mode of treatment from what is generally practised. As matter of convenience, all this is, no doubt, unexceptionable enough; for a world of trouble and perplexity is thereby spared; but, as far as art and its interests are concerned, it is most injurious.

As a supporting member to an entablature, a column is beautiful and consistent in all its parts, every one of which has its motive, and bears to the column itself that kind of relation which the other does to the building, of which it similarly forms a part. But if the column is made an independent upright mass, unconnected with any thing else, it becomes quite faulty, and errs against the principles of art, for the very reason that it was before in conformity with them. For instance, the greatly increased bulk at its summit, and the spreading-out abacus of the capital, are admirably contrived, not only as regards æsthetic feeling, but the office which the column has to perform; since, while the tapering shaft combines stability with lightness, the capital resumes the diameter of the foot or base, and thus, both corresponding importance as to bulk, and increased importance as to embellishment, are obtained above; and, farther, stability is consulted by a broad surface being provided for the architrave to rest upon. In a single column, on the contrary—more especially in one of very great magnitude, and not shaped out of a single stone, but *built up* out of a number of pieces—such expansion at its summit becomes little less than preposterous—purposeless in itself, and so far from conducing to stability, causing the whole to appear infirm and top-heavy. It becomes a piece of *nonsense* architecture, and so much worse than schoolboys' nonsense verses, inasmuch as it is greatly more expensive. In the Egyptian obelisk, and again in the Gothic spire, the mass terminates in an acuminated apex, whereby the bulk is there reduced to a minimum; whereas, in the column, we have sudden expansion after previous diminution—an expansion truly admirable with reference to the purpose for which columns are intended, but unmeaning almost to deformity where all idea of such purpose is repudiated. But, it will be argued, the proposed column will have to support something. True; yet what is that something? An object quite unimportant as to bulk, most disproportionably so in comparison with the mass of the capital; and, farther, a mere excrescence, a statue upon its own pedestal, stuck upon the summit of such column, with the blundering intention, it would seem, of putting that which as a monumental figure ought to be principal in the design, quite out of sight as a work of art, and converting it into a mere accessory. It would not be a whit more preposterous to place such a figure on a single pedestal of the same height as the entire column itself.

In his answer to the queries proposed to him and to others by the committee, Sir F. Chantrey says:—"Of the statue which is to be made I can give no opinion; but if it be to measure only 17 feet, its bird-like size will not be *much* in the way, and if formed of Portland stone, it will not be *long* in the way;" which, *by the way*, was an observation which shows Sir Francis to be somewhat waggishly inclined. The author of the "Palace of Architecture," again, compares a statue perched upon the summit of a column to a "little sweep upon a chimney top;" and most strongly protests against the solecism of employing a column for such purpose, declaring that "a Greek would have eaten his fingers off, ere he would have pencilled such a design."

Still, there is sufficient classical authority—Roman, if not Grecian—for such application of the column shape. We will not be quite certain that there is; at least, we do not conceive that so elaborate a work as Trajan's Pillar, rich from top to bottom with storied sculpture, can be quoted as a precedent for such a mean bald affair as our York Column is—a mere piece of masonry, that looks

very much like as if intended to be a standing satire upon the manner in which we imitate ancient models and precedents, by omitting all that gives them æsthetic value or interest as works of art! If the Roman monument is not free from absurdity, it has, at all events, much to reconcile us to it, and make us overlook it. It may be very true that it would be quite idle for us to think of rivalling the prodigal display of either the Trajan or the Napoleon monument; yet that becomes only a reason why we should carefully abstain from doing what must inevitably provoke comparisons which we are well aware beforehand must be greatly to our own disparagement. Wherefore should a third monument of the kind be erected in the metropolis, which, as far as general character goes, will appear—to ordinary eyes at least—merely a repetition of the others, and inferior in size to the one on Fish-street Hill; and which may very well pass as a fac-simile of that on Carlton Terrace, if the latter can for an instant be received as any imitation of the Trajan Pillar?

However, column it seems there is to be, for the foundations had been commenced, and were being carried on with all possible despatch at the very time the parliamentary committee, "having satisfied themselves that Mr. Barry's plan for laying out the ground in front of the National Gallery was, under all the circumstances of the case, well adapted to reconcile the various difficulties of the spot, and attain the desired end," were proceeding to inquire "what effect the column which is about to be raised by the Nelson Committee in the centre of the south side of the square, would have upon the National Gallery; how far a column of such dimensions would be seen to advantage in such a position; and how far it would contribute to the embellishment of that part of the metropolis." It was made a question whether even then it would not be more advisable that some other site should be found for the column, which, at all events, will not now occupy the centre of the square, as originally proposed; a circumstance that alone will, we apprehend, produce a most awkward effect, whether as regards the general locality, or the column itself; for, while the square will greatly need some central object, the column will look as if it had walked out of it, or had been erected on one side by mistake; in short, as if some egregious blunder had been committed. Mr. Barry is decidedly adverse to the column being erected there at all, saying, "I think it would injure the effect of my design for the laying out of the square, and I think the objection is *much stronger* as regards other points of consideration, namely, with reference to the position of the column as respects surrounding objects." Before stating the opinions given in by other professional gentlemen, in reply to the questions proposed to them by the committee, it may be advisable to introduce here an account of Mr. Barry's plan for laying out the square itself, the works for which are now going on; and this we shall do nearly in his own words. "The area is proposed to be level; on the north side, in front of the National Gallery, is proposed a terrace, 165 feet long and 32 wide, with a flight of steps at each end to the area below, with ample landings in the circular corners of the square. The terrace is proposed to have, at each end, two large oblong pedestals for groups of sculpture, and circular pedestals for candelabra are to be placed at the foot of each of the flights of steps, as well as at the angles of the square towards Cockspur-street and the Strand. The terrace and flanking walls of the steps are proposed to be surmounted by a balustrade (terrace and balustrade together, 14 feet high); and the embankments, or retaining walls to the surrounding streets, to be surmounted by a solid parapet 3 feet high. The front, or south side of the square (about 350 feet by 260 feet), and the north side of the terrace, towards the road in front of the National Gallery, are proposed to be closed by ornamental stone posts, so placed as to be a barrier against horses and carriages, and the area itself to be covered with asphaltum."

After having specified his objections against the column being erected there—among others, that the area is too small and confined, that the apparent size of the square would be reduced, and the surrounded buildings rendered insignificant, Mr. Barry was asked whether he would recommend any alteration in his own design for laying out the square, in the event of the removal of the column, and replied: "I should not wish to make any change in the general principles of it. It would in my opinion be desirable that the area should be left wholly free from all insulated objects of art, which, in consequence of the irregular form of the square, would be unfavourably seen from many points of view. The four pedestals at the top of the flights of steps from the terrace might be surmounted by groups of sculpture, and in the centre of the terrace wall might be a fountain composed of sea-horses, naiads, and tritons, surmounted by a semi-colossal figure of Neptune, which, for the sake of the composition, and for obtaining an effective view of it both from the square and the terrace, might be placed above the level of the balustrade. The circular pedestals at the foot of the flights of steps, and the angles towards Cockspur Street and the Strand, might be surmounted by candelabra, supported by groups of figures, and containing each a Bude or Drummond light, from which the entire square should be illumined by night. Thus an opportunity would be afforded of giving scope and encouragement to sculptural art of a high class, and of giving that distinctive and artistic appearance to the square which is so much needed in the public areas and squares of London."

With this last remark we most cordially agree; nor have we at present any thing of the kind here proposed. We have indeed a few single statues; yet they are not only unimportant as to size, but either shut out from public view by being placed in the centre of the garden enclosures of squares, or else so placed as to produce no effect, or indeed be scarcely visible, bronze figures being placed with a background of foliage immediately behind them. We had therefore hoped that some composition in which sculpture would predominate would be selected for the Nelson monument, both as being a decided novelty in itself, and as interfering less than almost any piece of architecture would do, with the surrounding buildings: or, if some lofty column-like object was considered most appropriate, surely the artists who were of that opinion might have hit upon something more appropriate to the particular purpose, and less stale in itself than a mere column, such as we behold every day in buildings, and which, as far as design is concerned, is entirely the work of the hand—such a design as any junior articled clerk could any day produce. Surely something partaking of the candelabrum form, proportions, and decoration, might have have been imagined.

We trust that Mr. Barry's ideas will be fully carried out; but, even if not, there can be little doubt that the lower area and terrace will produce a novel and somewhat scenic effect, and that the appearance of the National Gallery will be materially improved. Whether we may anticipate for that edifice the alterations recommended by Mr. Barry, is a question we dare hardly ask. He has suggested that the façade might be greatly mended by giving it that consistent finish which it now so obviously lacks; by substituting a bolder cornice in lieu of the present one; by continuing pilasters or columns throughout; by giving greater elevation to the dome, and encircling its tambour with engaged columns; and by increasing the height of the parapet so as to conceal the lanterns which now just appear.* Should such alterations ever be undertaken—though we are greatly afraid they will not, we would suggest on our part that the pediment of the portico should be made somewhat deeper also, be crowned by a bold and rich *epitithedas*, and have its tympanum filled with sculpture; that statues, perhaps in a sitting attitude, should be placed on the piers at which the flights of steps begin to ascend; and, though last not least, that a handsome solid podium (about five feet high) should be substituted for the present insignificant railing, which alone is sufficient to counteract what classicality of appearance the building may else possess. Though Mr. Wilkins piqued himself a great deal on his feeling for Greek architecture, and on classical taste, he seems to have considered that it extended no farther than to columns, porticos, and pediments; as witness the introduction of this most unclassical railing, and the truly barbarous and contemptible dome.

Here we must for the present break off, reserving for some other opportunity our remarks on the rest of this report, and the diametrically opposite opinions given by the different professional gentle-

* It strikes us that considerable expression in regard to character, to say nothing of originality, might have been obtained, had these lanterns, instead of being attempted to be hidden, been made *effective and ornamental features* in the design, and made to point out at once that the upper floor consists entirely of picture rooms lighted from above. But, perhaps, it is easier to let people see that such things are not intended to be seen by them, than to convert them into beauties, and make them contribute to the rest of the design. If the art of doing so have ever been written, it must have been in a chapter that has been torn out of all architectural books, though more worth studying than almost all the rest of their contents. We suspect it, however, to be one of those arts which, if ever learnt at all, must start Minerva-like from the scholar's own brain; nor is it every one who carries a teeming Jupiter's scull upon his neck.

men consulted, in their replies to the questions proposed to them. We cannot however refrain from at once expressing our astonishment when we find one of them (Mr. Donaldson) deliberately saying upon paper, that the buildings on the east and west sides of the square are, though not sufficiently monumental, "imposing in style!"

We would advise our readers to get, in the meanwhile, the report itself (and it costs only sixpence) for if, in addition to the information it contains, they should find in it as much amusement as we ourselves have done, they will have more than sixpennyworth of laughter before they get to the end of it.*

MR. DREDGE ON SUSPENSION BRIDGES.

SIR,—The account and early history of Suspension Bridges, by Mr. Fordham, in your last Journal, are interesting, but I cannot agree with his theory. It may answer in as far as it relates to a rope or chain suspended from two props in a pendent curve, or bridges according to their common construction: the theories of other men will answer the same purpose, and though they differ in some degree with each other, yet I believe all of them approach the truth as near, or nearer, than what is called an equal sized rope or chain. However, be this as it may, it must be obvious, to every one who will bestow a thought on the subject, that there is an immense difference between a bridge and a pendent curve. The distress and forces that a pendent curve is necessarily exposed to may be compared to an individual with an immense load on his head, and nearly half as much in each hand, with his arms extended horizontally, this may be called equilibrium, and I will add, *frightful destruction.* The consequence is, pendent curves and bridges cannot be carried out, but to a very trifling extent, and that, too, at a very great cost, and hence their destruction is easy.

A bridge on true principles may be compared to the same, with this difference, the individual's head load is reduced, considerably more than four-fifths, his hands unloaded, and his arms at rest. I will add some farther description of both, with my easy method of computing their forces, to give the scientific an opportunity of investigating its truth, and to induce some competent person to found a simple formula for each, sufficiently intelligible for every one to understand.

An equal sized pendent curve is merely two lines resting on four points, it is exposed to two vertical and two horizontal forces, two of which rest on its centre, and multiply directly as the length of the curve, and inversely as its depth, and the other two rest on the suspension points, in addition to the central forces.

So, if the depth of a pendent curve be one-twentieth part of its length, and its weight be 1000 tons, its two central forces would be 5000 tons, and the two at its suspension points, 5500 tons. This shows that a pendent curve should taper, and the spider's web proves it.

A suspension bridge has depth and length, which is power and reduction of power; it consists of a series of curved and horizontal lines, which should be connected by rods in an oblique direction, and its chains should taper as they recede from their fulcrums to the centre, then every part of a bridge, in the most powerful posture, would equally contribute towards its own support, and in supporting any extrinsic loads to which it may be exposed. For computing its forces, the simple formula for computing those of steelyard beam, or common lever, will answer well.

The chains of a suspension bridge of equal area at their fulcrums, and of the same length and depth as the pendent curve, whose weight and forces I have before alluded to, would be but a third of its weight; the other two-thirds being a useless, destructive load, its removal annihilates its central forces, and reduces those at the suspension points to 1000 tons; so, in one simple structure alone, of such dimensions and weight, this system would be a saving of 666 tons of iron, and an increase of 4,500 tons, with many other advantages. Now, however startling this may appear, nature's countless forms are direct confirmations of its truth, and of economy and power.

Beams are exposed to the same forces as common bridges and pendent curves, therefore they deflect at the centre, and frequently break down by their own weight; to prevent which, and to increase their power, iron compression trusses are often had recourse to, but inasmuch as the tensional capability of iron is proved to be incalculably greater, then in the same ratio iron suspension trusses must be superior.* The two central forces that are so effectually destructive in pendent curves and common bridges, are as effectually removed by the system I advocate, and have adopted in the Victoria Bridge, at Bath: it also reduces their cost full two-thirds, and at the same time increases their power as much, and it prevents that vibratory motion which is so objectionable in suspension bridges. The following are some calculations that I submitted to the British Institution at Newcastle, in 1838, and no person has yet attempted to refute them. "Of the design I gave for crossing the Avon at the St. Vincent's Rocks, the following are its dimensions, weight, ultimate power, and estimate. The distance between its points of suspension is 700 feet, the deflection of the chains one-tenth of its length; the weight of chains and oblique rods, 60 tons; roadway, &c., 130 tons; and the sectional area of the entire chains at both fulcrums, 132 square inches. M. Chally, engineer of the Fribourg Bridge, found that best iron, when drawn into wire, was equal to 52 tons per square inch, and Telford ascertained that a bar of 5 inches was equal to sustain 27 tons per square inch; therefore it is in a fair ratio to presume that an inch bar is equal to sustain 30 tons, and having proved it by experiment, I have made my calculations accordingly.

		Tons of Power.
The section of the chains at both fulcrums, 132 square inches	132×30	$= 3960$
Weight of chains and oblique rods	$60 \times 1{\cdot}5$†	$= 90$
Platform	130×2‡	$= 260$
Surface of platform, &c., equal to contain 8700 persons, each weighing 140 lbs., total, 543 tons	543×2‡	$= 1086$
		1436
Surplus power		2524
In tons		3960

If you will insert the above in your useful journal, you will add an additional favour to those already conferred on,

Sir, Your humble servant,

JAMES DREDGE.

Bath, August 11, 1840.

P. S.—The plan that I submitted to the Directors of the Clifton Bridge, I designed to rest upon the rocks, which on both sides offers better fulcrums and masonry than art can supply; indeed, it could be erected in fewer months than the towers will be years in building, and at half their cost. Lord Western, in a letter to Lord Melbourne, has in the clearest manner pointed out the unerring truth of the principles on which my system is founded; and every experiment that I have exhibited has proved its truth. These have been made before the President of the Royal Society, and other noble lords; at the College of Civil Engineers, when several noblemen and other competent persons were present; at the Royal Gallery of Science, London; also at Bath and Bristol, before competent persons. In the Royal Gallery of Science, Adelaide Street, London, models are deposited, with springs at several points, which clearly and fully represent the focus of both systems.

* Since this article was in type, we have seen a letter in the Times (Aug. 29), protesting against Mr. Railton's column being erected in Trafalgar Square, but so far from objecting to the design itself, recommending that it should be carried into execution at Greenwich Hospital. Most unquestionably, that spot would be a most appropriate one for a public monument to Nelson, and a noble object might thus be provided to terminate the architectural vista from the river: but a mere column so placed would be too disagreeable an anti-climax to the rest. The objections against such perverse application of the column form would still remain in full force; and however creditable it might be in all other respects, a structure of that kind would be no very honourable monument of British art.

* See Smeaton's Method of Trussing Beams and Girders, &c.

† The length of the bridge being 10 times the deflection of its chains, whose centre of gravity is one-third of their length from each fulcrum, their weight multiplied by 1·5, the factor, is 1·66, but its curve yields some advantage.

‡ The roadway centres of gravity being half way between the towers and its centres; therefore it appears that its weight would multiply by 2·5; but inasmuch as it is sustained by the segment of a circle, and a considerable portion of it being sustained without affecting the chains, I multiply the entire weight by 2, which amply shows the natural tension.

COLLEGE FOR CIVIL ENGINEERS.

At page 151 of our Journal, we offered a few plain observations on the expediency of founding an establishment under this title, and on the manner in which some of the details have been arranged. We have reconsidered the subject with the utmost attention; and the result has been a confirmation rather than an abandonment of the general principle by which we were guided upon that occasion. If it actually is good to schoolmaster young men in the craft and mystery of civil engineering, by parties who are no engineers themselves, and never had the slightest practice in the profession, then, by parity of reasoning, pupils or apprentices should be schoolmastered into all professions and trades whatsoever. For instance, we should have all the notable old ladies of the country installed professors of a "college" for ——, heaven forfend! not of "physicians;" the damsels who ply at Billingsgate would make a "right worshipful *senatus*" in a "college for barristers;" and we know no better professors of the craft and mystery of breeches-making than hod-men of the sister kingdom, inasmuch as they are better acquainted with the luxations and other casualties of these necessary adjuncts to human comfort than almost any other class of persons.

There may be some who may think that we treat this apparently grave subject with too much levity; but really it is beyond all ordinary power of face, soberly to bear the contemplation of a matter in which the gravity is a maximum, and the wisdom a minimum. The plea of "good intentions" may be true, in as far as the parties are concerned; but we can admit no man's good intention, without it is substantiated *per actum intentio;* for, as public journalists, it is with actions only that we have to deal; and intentions are wholly without our province. Supposing, however, that the absurdity is got the better of, and it is demonstrated that all practical operations can be better taught by schoolmasters, in colleges or other establishments, who have no interest, pecuniary or otherwise, in the work done; and, farther—which is straining supposition to the utmost that it will bear—supposing that, by some peculiarly happy combination and developement of the cranial bumps—for we are sure nothing else could do it, men who had never practised or even studied engineering, should understand better how to train engineers, than those who have been regularly bred, and are every day in the practice of the profession;—supposing all this, there still remains a very serious question to be answered: What is to be done with these youngsters after they are "finished" at the "College for Civil Engineers?" This is a question which may not have occurred to those concerned in the College; but it is very likely to be a preliminary one to every parent or guardian who may have thoughts of sending a son to learn this profession. It will be observed, that the age of admission into the school is fourteen, by which time any boy, fit for an engineer, will have made considerable advances in his ordinary school education; and that after this, the course is to last five years, at an expense of £130 per annum, or £650 for the whole, including board; or, without board, £500 for the education alone. Now, we calculate, that any thinking man will, before paying this £500, consider what return he is to get for it, and what he is to do with his son or ward when, at the close of his nineteenth year, he is returned, finished, from the establishment. In all the college classes he may have had the greatest aptitude and diligence, and it is not impossible but that he may have been wiser than all teachers; but, admitting this, we would ask, what progress he has made towards actually becoming a civil engineer? No individual or company, reckless as the latter sometimes are in the matter of expenditure, will ever think of employing a raw school-boy in planning and executing a work which is to cost a great deal, and which money will be worse than thrown away, unless the party entrusted with its execution is a man of actual experience, as well as of scholastic learning. "But his education will be so superior, that the engineers already in employment will be forward and proud to take him instantly under them, at a handsome salary?" They will do no such thing; they will not take him into their employment, except as an apprentice, on the same terms as they now take apprentices; and even then, they will take him with great reluctance, if at all, because they will have perception enough to know, that the pretended engineering which he fancies he has learned at college will be a bar in the way of his usefulness to them.

Taking, therefore, the most favourable view of the case that can well be taken, nothing but a loss of two or three very expensive and highly valuable years, of the life of a young man, will be gained by the college. £500 is, we believe, about the maximum which engineers, except those of extraordinary name, charge for board and lodging during the time necessary for so far learning the profession as that the pupil may, immediately on the expiry of his term, be fit for doing work, and earning a salary as an assistant, which will, in due time, prepare him for obtaining and executing work on his own account.

The pupil, when he enters the office of the engineer from a common school, may not have received a course of education so lengthened and lofty in the nomenclature of its several parts, as that which this college holds out; but the value of school learning to a man in his profession depends much more on the quality than on the quantity; and we are inclined to think that the pretended practice of engineering obtained here would be rather injurious by making the party conceited. Real practice, it is obvious, they could have none; for nobody would employ the professors and their scholars in the actual planning of a rail-road, or in the construction and superintendence of any public work whatsoever; and, as for the mere school examples, there would be no responsibility about them, farther than working them according to the fancy of the master; and thus the real tendency of the course, however elaborate, would not be to make engineers, but to make engineering schoolmasters.

Therefore again, without reference to any feeling which engineers in employment might have against the pupils of such an institution as this, they would be of no more use in the offices of the said engineers than the pupils of any ordinary school. Hence, prejudice altogether apart, engineers would not, even if they were willing, take such pupils into their establishments as any thing else than mere apprentices, who would have to begin at the beginning, and pay the full amount of the ordinary premium. We have estimated this premium at £500, for board and instruction; but we believe it could be managed for £50 or £100 less than this, even under a professional man, in full practice, who could find actual employment for his pupils from the very beginning, and thus afford them that best of all descriptions of instruction, opportunities of finding out for themselves both what they had to do, and the best method of doing it; and if there is one class of men who, more than another, require to be emancipated from the dull and formal routine of the schools, and left at liberty to gird themselves for any emergency that may arise, it is the class of civil engineers.

If we compare the premium now stated, for instruction under a professional engineer, with the cost at the college, we shall see that there are great advantages in the former, in the saving both of money and of time. Upon the average, the engineer's pupil will be capable of earning a salary before the university pupil is "finished;" and there is a pecuniary difference of, say £250, which would suffice for two or three years of preparatory education at one of the best mathematical schools in England, or for an entire course of philosophy at a Scottish university. This alone may and will suffice to make the College for Civil Engineers to kick the beam. But this is not the only, or the greatest, advantage which the pupil of a professional engineer possesses over the other. The professor, however talented he may be, has no very great inducement to accelerate the progress of his pupil; for, in this establishment at all events, he is to have his stipulated salary, in nowise depending upon the success of his teaching. But the engineer has a direct interest in communicating professional knowledge to his pupils as speedily, as fully, and as perfectly as he possibly can; because the sooner he can do this, the sooner he is enabled to employ them in a way profitable to himself, as well as doubly profitable to them. In this he sets them to do real business, and not mere school exercises; and, unless they are properly qualified, he is sure to lose both his employment and his character; whereas the professor may drone away in any style, provided he can retain the good opinion of his patrons, and well-managed adulation—so experience reports—is at least as likely to do this, as the most efficient and faithful performance of duty.

There is yet another point, and one of no secondary importance. Besides the direct loss, both of money and of time, to the parties seeking professional instruction in an institution such as that under consideration, such an institution has, that is to say, would have, had it any positive effect at all, a tendency to do gross injustice to the practical engineer; and no small injury to those by whom he

is employed. This will be evident, when it is considered that an engineer derives a considerable and most legitimate profit from his pupils; and he does so, not by taking money out of their pockets, but by the very fact of instructing them; and the more carefully and successfully he communicates this instruction, his profits are the greater and the more certain. In consequence of this, a clever engineer, who is at the energetic period of life, and has not yet even that name to which the farther exercise of his talents will entitle him, is enabled to extend his connection, and perform whatever is entrusted to him at a much smaller expense to his employers, and consequently with much greater advantage to the public, than if he had to hire all his assistants, and pay the price of their labour. Not only this, but it would be difficult for him to obtain the requisite assistance, in cases where it were required, without subjecting himself to a permanent expense, which no young engineer could bear. Engineering, except with the fortunate few whose names are at the very top of the profession, is but a casual employment, and no man could be expected to keep a corps of assistants, at constant salaries, to meet contingencies of demand, without greatly increasing his charges to the public, or having the work done in a bungling or inefficient manner. His pupils, however, enable him to do this; and doing it is an advantage to themselves. When there is no work in hand, they can be employed in the office, in studying the principles of the profession, and performing all the in-door parts of it, while the premiums they pay enable their master to go on until an engagement occurs. Then, when this does come, he is at once ready to enter on the performance of what is required, and to do it both better and cheaper than he could possibly do by any other means. Contrast this with the college, in which, whatever of school exercise there may be, there can be no real practice of the slightest value to the public; and it will be seen that, even admitting the instruction to be equally good in both cases, the college system is a dead loss as compared with the other; and the public may be thankful that college-bred engineers must, from the very nature of the case, be excluded from the profession; and the said public would do well to bear in mind, that all the loss, both professional and pecuniary, arising from the withdrawal of pupils from professional engineers, to place them in a college, would be a public loss, and tend more to injure the engineering profession than any other project upon which the most addle-witted could stumble.

In our former paper we took some notice of the practice, that is, the preliminary practice, of the "College for Civil Engineers." We have now examined the principle; and we think that every candid reader must admit that the institution should and will be condemned upon principle, without any reference to practice. We alluded to the Polytechnic institutions of foreign countries; but we did so solely with regard to practice. These institutions, in their first establishment, were intended to answer very different purposes from those to which this college aspires. They were results of the war system, and the grand and primary object of them was to produce efficient military engineers; and had there been profound peace, and no military engineering going on, the probability is that not one of those Polytechnic schools would have existed. They may have answered for civil purposes, in the absence of something better; but, if they have done this, the grand cause is to be found in the fact, that, of engineering works abroad, a very great proportion are undertaken and executed by the governments. We are not now comparing the merits of systems followed by nations; all that we mean to say is, that our system is to proceed by means of private speculations; and it accords with this, that these speculations will naturally, and almost necessarily, employ private engineers.

Thus we have examined, with all possible care and candour, the principle of the "College for Civil Engineers;" and the conclusions at which we have arrived are these:—First, it would be far more expensive, and less efficient, than the method hitherto followed in this country. Secondly, the very fact of having attended this college would go far to exclude those who had done so from the profession. Thirdly, it would be great injustice to professional engineers, and tend much to lower the tone of the profession: and, Fourthly, it would be a most serious injury to the public. We have promised however to give some account of the financial state of the College, upon which its continuance or non-continuance must of course depend, and this promise we shall fulfil as soon as we are in possession of the facts.

MODERN FRENCH VANDALISM.

[BRITISH CRITIC, NO. 54.]

As the above-named periodical devotes itself chiefly to subjects of theology and divinity, and to religious publications, it is not likely to come within the notice of architects and architectural readers, notwithstanding that a paper occasionally appears in it calculated to interest them,* we shall now make some comments on the one in a recent number, headed "The Churches and Cathedrals of France." Most willingly would we disbelieve the writer's statements, for he presents us with such a picture of systematic and wanton destruction, spoliation, and desecration, as we should hardly imagine possible, more especially under a government affecting to extend its protection to all works of art, and which has actually appointed an inspector-general of historical monuments; were it not that those statements appear to be fully borne out by documents and facts; while it is, perhaps, in consequence of the devastations which have been committed, that some effort is now being made on the part both of the government and private bodies, or individuals, to arrest their farther progress.

Extraordinary as it must appear, the Restoration of the Bourbons was the commencement of a most fatal period for the architectural monuments of France. "It has been incontrovertibly proved," says the writer, "that *during the fifteen years of the Restoration, more irremediable devastations were committed in France than in the period from* 1789 *to* 1813! This destruction was certainly not enjoined by the government, but it was done under its eyes, with its tolerance, and without exciting the slightest marks of its solicitude."

The present government has manifested a willingness to check this species of Vandalism, although it has not been able to do so effectually; and, strange to say, its laudable efforts have been mainly thwarted by the obstinacy, wilfulness, and bad taste of corporate bodies, landed proprietors, and the clergy themselves! It was only by the utmost exertion of his authority as Inspector-general that M. Vitet prevented the municipality of Poitiers from pulling down the baptistry of St. John, the most ancient monument in that city. An enumeration of the edifices which have actually been destroyed would present a fearful catalogue of buildings and historical monuments of which France has, of late years, been despoiled. At Valenciennes, the last of the Gothic arcades which ornamented its streets has disappeared, as has likewise the most curious portion of the Hôtel Dieu, founded in 1431; at *Bruges*, the cathedral of St. Donnat; at *Liege*, that of St. Lambert; at *Arras*, that of Notre Dame; at *St. Omer*, the ruins of the Abbey of St. Bertin (considered the finest of central Europe), have all been destroyed, not by popular violence and frenzy, but under the sanction of the respective local authorities. At *Angers*, the church of St. Peter has been profanely converted into a theatre; while, more scandalously still, that of St. Cesaire at *Arles*, considered by antiquaries the oldest in France, has been turned into a *mauvais lieu* or public brothel!! at Paris, "the exquisite church" of St. Côme has been taken down in order to lengthen the Rue Racine. At *Langres*, St. Didier has been converted into a dèpot for fire-engines and wood; at *Dijon*, where the St. Chapelle was taken down in 1803, the church of St. Jean has been turned into a storehouse, that of St. Stephen into a market, and that of St. Philibert into cavalry stables. At *Forjuy*, in Thiérache, the church built by St. Bernard, which was "400 feet in length, and stood two or three years ago in all its pure and native beauty," has since been taken down, "without a remonstrance from the neighbourhood." At *Bourbon l'Archambault*, the St. Chapelle, "the glory and ornament of the Bourbonnais, was demolished by an *architect*," in order to sell the materials:

* Several other periodicals contain architectural articles, which being scattered through so many volumes are almost lost sight of, after a time at least, by those who are chiefly interested in them, but who have not the means of referring at pleasure to a number of works, all of them consisting of very long sets of books. We shall perhaps take an opportunity of giving a list of such papers of the kind as we are acquainted with, and in the meanwhile here merely name those literary journals in which articles of the class alluded to are to be met with:—"Quarterly Review," "Foreign Quarterly Review," (these two periodicals contain a far greater number than any other); "Fraser's Magazine," "Blackwood's Magazine," "Printing Machine" (discontinued), and "Westminster Review." The last contains only one paper of this kind, viz., on Egyptian architecture; but, as far as we are aware, the "Edinburgh Review" has not given a single one in the whole course of its career. The "Gentleman's Magazine" need hardly be named, because it is well known that architectural and antiquarian topics form an especial feature in it.

the last stone was removed in 1837. Even *Clairvaux*, that celebrated sanctuary, has not escaped modern Vandalism: "its exquisite church, so beautiful in its proportions, and so complete in its grandeur, which dated from the 12th century, and was said to equal Notre Dame, at Paris, in size," after surviving the havoc of the Revolution, was destroyed in the first year of the RESTORATION!! At Chartres, several of the painted windows were removed from the cathedral by a prefect, to decorate his own private chapel.

Besides wholesale destruction or spoliation, much injury has been committed on a smaller scale, by the removal of ancient fonts, screens, &c., "which has taken place in nearly all the churches of the north and east of France." Ancient tapestries have also suffered the same fate; therefore, when such decorations are wanted for particular *fetes*, any thing of the kind that offers itself is borrowed or hired for the occasion. Thus, "on the Good Friday of last year, the Saviour's tomb in the Church of St. Sulpice, at Paris, was ornamented with tapestry hangings, on which was embroidered in vivid colouring the *Feast of Antony and Cleopatra*, the attire of the Egyptian queen being of the most immodest and exceptionable character; and, on the same day at St. Germain des Près, *Venus bringing Cupid to the nymphs of Calypso*, was considered an appropriate ornament!"

Nor does the mischief stop even here, for it seems that what destruction and profanation leaves untouched, modern *beautifying and churchwardenizing* spoil and corrupt. Whitewashing or rather daubing over the whole of an interior with a glowing coat of ochre, has been employed to a most frightful extent; the cathedrals of Chartres and Coutances, and the Roman church of the famous abbey of St. Martin at Laon, have been thus besmeared; as has the "curious church" of the Abbey of St. Michael in Thiérache, (now made *yellow, orange, and white*) and the cathedral at Lyons:—"the last is the handywork of M. Chenevard, an *architect*, to whom is to be imputed the dilapidation of the ancient nave of the cathedral at Bellay, as well as the so-called restorations and distressing repairs of St. Vincent's, Châlons-sur-Saône." All this is exceedingly vexatious and provoking, yet we are almost provoked to smile when we learn that the curé of Bourg has had the walls of his church painted *blue*, the columns *pink*, and the plinths and cornices *yellow*.

Possibly the writer himself has taken the liberty of *colouring* up his statement rather highly: at least it is to be hoped so, and that of many of the edifices whose destruction he records, their antiquity constituted their chief claim to preservation. Whatever may have been their architectural merits they do not appear to have been much known to English antiquaries, or writers on Gothic architecture, for we can find no mention of them in Whittington, Hawkins, Woods, &c., and it would be in vain to look for any account of them in any English books of travels through France. Still, after reading this paper, the impression inevitably remaining is, that a great deal of mischief has certainly been done, not by iconoclasts, or in consequence of overstrained religious scruples, but in a *professedly* Catholic country. We would therefore recommend a serious consideration of the article in the British Critic to the author of "Contrasts," who has been pleased to inveigh against the Reformation and Protestantism as the causes of the corruption and degradation of ecclesiastical architecture. An apology for both the *doings* and *undoings* of his brother Catholics in France may now exercise his pen, and display his ingenuity.

PERSPECTIVE.

PROJECTION OF A CUBE.— COMPOSITION OF THE SQUARE AND OF THE CUBE OF THE SUM OF TWO LINES, THAT IS, A LINE EQUAL IN LENGTH TO BOTH OF THE TWO TAKEN TOGETHER.

BEFORE proceeding to explain the remaining elementary proposition in perspective—namely, the projection of circles by the help of squares, we shall farther illustrate the problem given at page 153 of our seventh number; as that, being the fundamental one, requires to be thoroughly understood before any thing more difficult is attempted.

PROBLEM II.—To project a cube, having two of its faces parallel to the plane of perspective, and two of the remaining ones horizontal and two vertical—we need not add that all these four must, as matter of course, be perpendicular to the plane of perspective, if the edge which forms the ground line is parallel to the horizon.

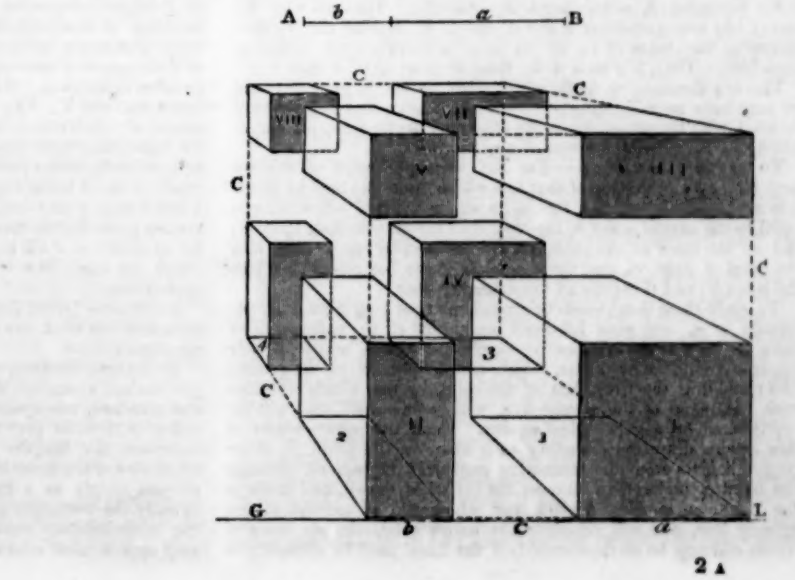
The only datum necessary for projecting the cube itself is the length of the edge, or, which is the same thing, the length of the side of any of the square faces. The distance of the eye, and the position of the edge upon which the cube is to be projected, must be given for any particular case; but it is not necessary to state them in any known measures in order to understand the problem generally.

Let, then, A B be the edge of the cube, and let it be made up of, or divided into, any two parts, *a* and *b*; and the whole line, A B, is evidently the sum of the two parts, *a* and *b*.

Farther, let S be the point of sight, and S V the distance of the eye; and the point V will be the vanishing point of one of the diagonals of any square, having two of its sides parallel to S V.

Place *a* and *b* on the position of the ground line, G L, which for the general problem may be taken at random; and let the parts, *a* and *b*, be separated from each other by any distance,—for instance, by the dotted line, C.

This being done and understood, draw lines from both extremities of *a*, and also of *b*, meeting each other in the point S, which is the vanishing point of all lines at right angles to the plane of perspective. From the extremity of *b*, towards your left hand, draw a line toward the point V, and it will cut the line from the opposite extremity of *a*, to the point S, in one of the angles of a square; each side of which will be equal to the two lines, *a* and *b*, together with the intermediate space, *c*. Through the intersection of these lines



draw a parallel to the ground line, and it will complete the square, having all its sides equal to the sum of *a* and *b*, together with the intermediate space, *c*.

From your left-hand extremity of *a*, draw towards V a line, and it will be the diagonal of the square of *a*; and from the intersection of this with the line to S from the right-hand extremity of *a*, draw a parallel to the ground line, and it will complete the square of *a* between the lines from its extremities, while it will mark off between the lines to V from the extremity of *b*, a four-sided space, equal to the rectangle of *a* and *b*, or as long as the greater of these, and as broad as the less.

From your right-hand extremity of *b* draw a diagonal to V, and a parallel to the ground line, through the point of its intersection with the line to V, from your right-hand extremity, will cut off from the distal portion of the large square, a rectangle as long as the whole side of that square, and as broad as *b*. Upon inspection it will be perceived that this rectangle consists of three parts; that towards your left hand being the square of *b*, that in the middle the rectangle of *b* and the space *c*, and that toward your right hand the rectangle of *a* and *b*. Leaving out the four spaces which answer to *c* in the sides of the square, and also that in the middle which answers to the square of *c*, and there remain four spaces, which have the lines a little strengthened, and are numbered 1, 2, 3, and 4. 1, on the ground line toward your right hand, is the square of *a*; 2, in the opposite angle of the great square, is the square of *b*; and 3 and 4, in the remaining corners, are each equal to the rectangle of *a* and *b*, only the one next the ground line has its length at right angles to that line, while the other one has its length parallel to the same.

As any line which is measurable can be represented by the number expressing its measure, the product of any number by itself answers to a square, of which the number expresses a side; and the product of any two numbers represents a rectangle, of which these numbers express the length and breadth. Hence we have the following arithmetical expression for the square of the sum of two numbers:—

The square of the sum of any two numbers, or any two quantities whatsoever, is equal to the sum of their squares, together with twice their product.

This is not necessary for the mere perspective projection of a square, or of a cube; but as the composition of a square can be seen in perspective, and as a perspective representation is the only way in which the composition of a cube can be represented on a plane surface, such as that of paper, we have taken them together, as that is the best way of making each an artificial of the other. The composition of the square is more briefly expressed, and more easily remembered, when stated algebraically. Thus let *c* be the sum of any two quantities *a* and *b*, and it is obvious that *a* and *b* determine the value of *c*; for its value is exactly equal to that of them both. Thus, if $c = a + b$; then $c^2 = a^2 + b^2 + 2ab$.

This is a theorem, or truth, which often occurs in practice; and we may have occasion to revert to it afterwards; but now we shall proceed with the projection of the cube, and the analysis, or composition, of the cube of the sum of any two lines.

To PROJECT THE CUBE.—For the accomplishment of this we have already a projection of that face which forms the base or under side of the cube, namely, the large square, each of whose sides is equal to the sum of *a* and *b*, together with the intermediate space *c*; and all the faces of the cube, except the parallel ones, vanish into the point of sight, S, and the diagonals of the horizontal ones into the point V, and these are all the necessary data.

To apply these data:—erect perpendiculars at your right-hand extremity of *a*, and your left-hand extremity of *b*; make each of them as long as the distance between these points, and join their upper extremities by a line, which will be parallel to the ground line; and thus the front face of the cube, or that which coincides with the plane of the perspective, will be obtained, and will be represented by a geometrical square. From the upper angles of this square draw lines meeting each other in the point S; draw perpendiculars from the remaining angles of the square, forming the basal or under face, to meet the lines last drawn, and through the points of meeting draw a line, which will be parallel to the ground line, and will complete the entire cube, the six faces of which will now be all represented, if the lines used in obtaining it are obliterated. Two faces will be seen parallel to the plane of the perspective, two parallel to the horizon, but situated below it, and two parallel to the vertical plane, but placed to your right of the central line, or perpendicular into which a vertical plane vanishes to a line, if it passes both through the eye and the centre of the picture.

This is one of the simplest methods of projecting a single cube, when it has two faces parallel to the plane of perspective, and the other four at right angles to that plane. The parallel faces appear as geometrical squares, only the one which is farthest from the eye has its lineal boundaries diminished in the proportion of the increase of its distance from the eye. The four remaining faces are projected into four-sided figures, having the boundaries at which they meet the parallel squares parallel to each other, but their other boundaries, namely those which extend right backwards into the picture diminished in proportion to their recession backward, and to their proximity to the centre line, or perpendicular passing through the point S.

Our object is not, however, simply to represent the single cube, whose edge is made up of *a* and *b*, together with the intermediate space, *c*, but to show the composition of the cube of a line as long as both *a* and *b*, in terms of those two lines themselves, our object in introducing the space *c* between them being merely to show them more distinctly, and as they would appear of the same magnitude and in the same position, if they were solids, of which only three sides could be seen from any one point.

To represent, them divide the perpendicular sides of the cube, beginning at the ground line, into three parts equal to *a*, *c*, and *b*, and through the points of section draw parallels to the ground line, of which parallels there will, of course, be two. Through the extremities of *a* and *b*, adjoining *c*, draw vertical parallels; and, from the points in which they intersect the horizontal ones, of which there will, of course, be four, draw lines, meeting in the point *V*, and draw lines, meeting in the same point, from both extremities of the part *c*, on the upper and lateral sides of the front face. Then raise perpendiculars from all the remaining angles of the four-sided spaces, numbered 1, 2, 3, and 4; and they will be parallel to the sides of the front and back faces, and to each other; and if all the spaces into which *c* enters as a dimension are rejected, the remaining portions of the large cube will be equal to the cube of a line as long as both *a* and *b*, and expressed in terms of those lines themselves. Of those portions of space or solids, there are eight in number, which we have distinguished by Roman numerals. I., on the ground line, towards your right hand is evidently a cube, and the cube of the part *a*; VIII., on the upper face, and at the opposite solid angle of the large cube is also a cube and it is the cube of *b*, all its edges being equal to that line. Of the remaining six, three have two of their opposite faces equal to the square of *a*, and their other dimension equal to *b*; and the remaining three have two of their opposite faces equal to the square of *b*, and their other dimension equal to *a*. II., III., and IV., have the first of these dimensions, and V., VI., and VII., have the last. If we suppose the spaces of which *c* is a dimension to be reduced to nothing, so that the remaining eight solids can be all brought close together, they will evidently form a perfect cube, and this cube will have all its edges equal, *a* and *b* taken together, that is, it will be the cube of $a + b$; *a* and *b* may be any lines whatsoever, because the lengths of them are not given in any number of any measure, and thus they stand for all numbers of all measures, or, in other words, any conclusions which we can draw with regard to them are universal in their application.

Let us now collect the eight solids which make up the cube of the sum, and see what are their values taken singly, and what is their aggregate value.

In the ratio between geometrical magnitudes and numbers, a single line and a number, which is not considered as the product of any two numbers, are quantities of the same kind, so that we can use either of them in preference, as may be convenient. Lines which represent the lengths and breadths of rectangular surfaces are quantities of the same kind, being products of two factors, each considered simply as a number, and not as a product; and consequently the rectangle of the length and breadth, or the product of the corresponding numbers, may be used the one for the other, as may appear most convenient. A rectangular solid is also of the

same kind with the product of the three factors, answering to its length, breadth, and thickness. If these are all the same, it is the cube of any of them; if two are the same, it is the square of that one multiplied by the third; and if they are all three different, neither cube nor square appears in the expression for the product. Now, if we revert to the eight solids in the perspective representation, we find the cube of a, the cube of b, three times a square multiplied by b and 3 times the square of b, multiplied by a, hence we have this general theorem:—

The cube of the sum of any two quantities is equal to the sum of their cubes, together with three times the square of each of them multiplied by the other, or expressing them by letters for the quantities and signs for the operations, if $c = a + b$, then

$$c^3 = a^3 + b^3 + 3a^2b + 3b^2a.$$

These are called the compositions of the second and third powers of *binomials*, that is, of quantities made up of two parts; and magnitudes, occupying space in the geometrical sense of the word, do not extend farther than this, though in the relations of quantities, whether expressed generally or by the common notation of arithmetic, may extend to much higher powers than the third; but these do not, of course, give results capable of perspective representation.

The composition of the cube does not occur so often in practice as that of the square; but still every surveyor, engineer, and architect, should be acquainted with it, not merely as an abstract truth, but as one which is capable of accurate representation by means of a dissected cube, similar to that which we have given in the cut; and it is a good elementary exercise for beginners in perspective to project such a dissected cube, in various positions.

SEWERAGE, OR DRAINAGE, OF LONDON.

Sir,—To my last letter, on the Sewerage of the Metropolis, you did me the honour to subjoin a short notice, inviting, from myself and others, farther communication on a subject of such paramount importance. I trust this invitation will have its effect, in eliciting from many of your correspondents, better qualified than myself, some observations, or suggestions, tending to an improvement of the present imperfect system. Of the evils of this system, some, as I have before observed, are attributable to the defective state of the present laws. These differ in different districts; and, as each commission is absolute within its own limits, and acts irrespective of the neighbouring ones, it *has* happened, that works have been undertaken in one district, without sufficient calculation as to their probable effect on others. A case of this kind occurred in the City of London, through which a part of the Holborn and Finsbury sewerage is conducted to the river. The sewers of the Holborn and Finsbury division having been greatly improved and enlarged, the City Sewers became inadequate to carry off their contents; and many houses in the vicinity of the river were inundated from the volume of water which occupied the main sewer. This has since been remedied; but if any thing like combination had existed previously, the improvements would have been carried on simultaneously, and such an inconvenience been prevented. With the legislative part of the subject, however, except incidentally, it is scarcely our province to deal; and I therefore turn to the consideration of the remedies to be devised for other obvious grievances.

One of the greatest difficulties attending the whole subject is, the low level of some of the old and populous districts, especially those on the water-side. These are subject to the greatest inconveniences from imperfect sewerage, and from the irruption of the tidal waters of the Thames. At such times, the inhabitants are exposed to the most disgusting smells; and the basements are filled with the waters of the sewers, forced back on them by the tide.

It is difficult, perhaps impracticable, to remedy this now, as all the existing sewers are built at the lowest level of the Thames' drainage; but it is surely possible to avoid it for the future, by vesting in the Commissioners of Sewers powers to prevent the erection of any building which shall be incapable of drainage.

This applies with peculiar force to those districts, such as Hammersmith, Shepherd's Bush, &c., which have been rendered below the Thames' drainage by means of excavation for brick earth. These hollows become filled with stagnant water, engendering the miasma and noxious vapour, whence infectious diseases are supposed to originate. Compulsory enactments would remedy this partial evil in one case, and time would remove it in the other; but no sewerage, on a large and perfect scale can be carried into effect, unless under the management of a central board of commissioners, responsible to parliament, and whose works are planned and executed under scientific and practical engineers.

It is remarkable that the situation of London presents peculiar facilities for perfecting a uniform and effective system of drainage. Standing on the bank of a large river, on ground gradually rising from the waterside to the elevated ridge of Highgate and Hampstead; it is obvious that lines of well arranged main sewers, at proper distances from each other, should extend from the latter, and, receiving the requisite collateral branches, debouche into the Thames. The natural streams and watercourses of the high grounds, being led into the sewers, would act as a scour for cleansing away the filth and impurities collected or deposited. By proper arrangements also, with the vast available supply of water from the different companies, we conceive it would be easy to direct through the sewers, periodically, additional streams to aid the others, or act when they failed.

Instead of brick arches, the main sewers should be constructed of a series of iron caissons (a plan, I believe, before suggested for a somewhat similar purpose), the top to be arched with sheet iron, the bottom laid with concrete or asphalte. The main sewers must be of sufficient capacity to carry off the waters in times of flood, and furnished with the necessary apertures for men to enter, at proper times, for examination and repairs: at all the gully holes, traps might be put down to prevent the escape of noxious effluvia, though we apprehend there would be less of this generated than at present, from the superior cleanliness of the sewers; and we should certainly be relieved from the multitudes of rats and other vermin now swarming in the neighbourhood of the sewers.

There are other considerations connected with the subject, but these I will, with your permission, refer to on a future occasion.

I am, Sir, yours obediently,

E. L.

THE STATUTE AND CUSTOMARY ACRE.

Sir,—The judicious remarks connected with land surveying in some of your numbers from your correspondents, and yourself having commenced a course of very useful regular observations upon the subject in your last, which I presume are to be continued, have induced me to take the liberty of drawing your attention to the relative proportions of the statute and the customary acre.

I have at various times made some considerable research into the works of several authors, both ancient and modern, but without being able to arrive at any satisfactory conclusion, as to their relative analogy or proportion, such as I anticipated; finding nothing to my mind at all satisfactory and conclusive, as to the origin of the "*customary* acre," or in what districts, or for what definite purposes, it was used, although I have once met with a statement of quantity in that measure.

I find the customary acre stated to contain 6760 square yards, while our statute acre contains only 4840; now these have no consistent relative proportion to each other, the smallest numbers they can be reduced to being thus, $\frac{6760}{4840} = \frac{13\frac{1}{2}}{9\frac{2}{3}}$.

I find the French arpent, or acre, contains 55,206 square feet, = to 6134 square yards. So that the customary acre is not a French acre; nor is there any satisfactory analogy between them now appearing. What custom in its flow of working may have done for them, so as to have altered their relative value, I know not, but the customary acre is not a French acre; and it cannot, I think, have originated with our French or Norman ancestors.

Again, the Roman jugerum, or acre, is stated at 28,800 square feet, = to 3200 square yards. Here again we have no relative proportion to either acre, so that neither can be traced to the Roman conquest and ascendancy. Therefore all my research hitherto has proved unavailing. But as I feel it to be rather an interesting subject, and if proportions can be discovered, it may assist the solution of very many *ancient* calculations in *old deeds*.

I shall be much obliged if you, or any of your intelligent correspondents, can throw any or such light upon the subject as to enable us to fathom the origin, and decide upon *when*, *where*, and for *what purposes*, it is now or has been used.

It is long since I met with the quantities in that measure (the customary acre) named above; but, if I mistake not, it was the measure of *woodlands:* this perhaps may give some clue to the subject.

I beg to subscribe myself, yours most respectfully,

W. Pocock.

Union-place, Stepney Green, 8th August, 1840.

[We give Mr. Pocock's letter just as we received it; but as the subject possesses a very considerable degree of interest, as bearing upon the extent of forests and various other portions of land mentioned in the records of old surveys, we shall be very glad to give insertion to any paper tending to throw light on the subject.]

SMOKY CHIMNEYS.

Sir,—Great attention has been latterly demanded to the cause of smoky chimneys. It seems to me that Nicholson's view of the subject is the most correct, and my belief has been strengthened by observation. It is, that the fire-place should be so constructed that a current of air may pass *over* the fire, and be confined near enough to be rarefied in its passage. Again, he says, "The tops of flues should not have such wide apertures as to permit a greater quantity of air to rush down the chimney, and counteract the force of the ascending rarefied stream."

That rarefied air has force in a great degree there is no doubt, and as an auxiliary, *at least*, must be greatly useful. Your correspondents, in the June and July numbers of your Journal, do not seem to have considered heat and rarefaction as at all necessary to the freedom of a room from smoke. Their attention has been paid to the *flues alone* (though, doubtless, of great consequence), and not at all to the fire-place.

I do not know of a country chimney corner from which the smoke escaped into the room. What is the cause? I can conceive no other than rarefaction; but here your correspondent's "horn" is no acquisition, for chimney-corner flues are always diminished at top at *least* one-third. I know of cases (in some new houses near Kilburn), where the chimney openings in the kitchens are very high, as much as 4 feet 9 inches; and the depth (only 14 inches) not being sufficient, what is the consequence? They smoke. Let any one observe a stove that is fixed forward, it must smoke, even having the advantage of a draft from a favourable quarter.

These remarks may induce some of your readers to bestow some attention on the construction of all flues and fire-places which may not be ordinarily made, so as to be convinced by practical examples when theory will not avail. By admitting this letter, you will oblige, Sir, your humble servant,

August 10, 1840. A Junior.

TO REDUCE OBLIQUE LINES TO THE HORIZONTAL PLANE.

Sir,—As a subscriber to your Journal, I am desirous of contributing my mite of information, in return for the very many useful remarks on surveying, which I have observed in your pages. Probably you may not think the contrivance worthy of attention, but I can assure you that in surveying a rugged, hilly district, such as this, I find it exceedingly useful, and it effects a great saving of time from the absence of all calculation. My contrivance is simply explained by ruling a sheet of paper into twenty squares,—say, that each of these squares represents one chain; then, by marking the angles of a quadrant without these squares, from one degree to ninety, and having the angle of inclination and surface distance of any portion of ground, I can instantly determine the length of the base or horizontal distance by merely laying a straight edge to the degree of inclination, marking off the measured distance, and letting fall a perpendicular on to the base. In like manner, by bearing the surface distance and angle of inclination I can as easily determine the height by the same simple contrivance. I do not mean to assert that this method is absolutely accurate, but it is easy of performance, and sufficiently near the truth for all common purposes of surveying, and as such, I think likely to be of use to the land-surveyor who, in most instances, even when capable of performing the calculations, is, from the lowness of his remuneration, little disposed to investigate the matter farther than to avoid any gross error which might arise from leaving this part altogether unattended to.

I remain, Sir, yours respectfully,

C. H. Roberts, Land-Surveyor.

Aberystwith, South Wales.

OBSERVATIONS ON THE INSTITUTION OF CIVIL ENGINEERS.

Few as are the months that have elapsed since we began our periodical labours, we have received a good many communications, animadverting on various subjects connected with the constitution and practice of this association. We have not published these letters for various reasons. First, we felt that we have not the whole case before us: Secondly, because some of the parties addressing us may have been actuated by personal and temporary motives: and, Thirdly, because we thought the proper time had not come. The respectability of the institution, and also that of the majority of those who have addressed us, show that the subject should be approached with the utmost caution; and the proper time for considering it, evidently is just before the commencement of an annual session. We may, however, mention the leading points. Of these, the first is the election of the president for life, which, in the opinion of our correspondents, has a paralyzing effect upon the energy of the institution, and will, though not in the existing instance, have a tendency to produce the same effects which injudiciously chosen presidents for life have had upon other institutions. We admit that, every personal consideration apart, there is considerable force in this objection. The presidency of this institution is, or ought to be, the highest honour that can be conferred upon any engineer; and, therefore, it were highly desirable that it should be open to competition to all duly qualified engineers, at the end of every twelve months. This would keep alive the energy of the whole; and as engineers of the first or more successful class have not the spur of necessity to goad them on, it would be but right that they should have the spur of emulation. Another thing:—the president of the institution is naturally looked up to, more especially by the younger members; and, in consequence, if he holds office for life, there is considerable danger that the institution will become tainted with mannerism; and that such members as have but little experience of their own, will be apt to follow his dictum rather than those laws of physical nature and construction which ought to be their guides, and which alone can lead them to improvements and new discoveries. But as there is danger of mannerism to the inexperienced portion of the members, so there is danger of indifference, of jealousy, or of both, on the part of those whose talents and experience are on a level with, or above those of the president. While we say this, we by no means wish it to be understood, that at the time of his election the president shall be anything but the very fittest person that can be obtained. But among civil engineers, as among other men, the leading man of the time arises out of the circumstances of the time itself, by causes which no human penetration can anticipate; and, therefore, though it be admitted by all that, at the time of his election, the president is the very fittest man for the office, yet no one can venture to say that he shall remain the fittest man for the whole term of his life, or even for the period of ten years. It was a merited compliment to make the late Mr. Telford president for life, because he was the father of the institution, without whom it might never have existed, or, at all events, its origin might have been long delayed; but though in his case there was a plea of honorary justice, that plea could not be pleaded in the case of any other, because no other engineer, however eminent, could be father of the institution. The individual act was the discharge of a debt of gratitude; but that did not make it any more appropriate as a precedent in other cases.

Farther, it is alleged that this presidentship for life has a tendency

to render indifferent to the institution those engineers who would have reasonable hopes of the office were the election annual. We are inclined to think there is a good deal of truth in this; and that it tends to produce something like opposition of those among whom the best interests of the profession and the public require the most perfect union. Indeed, in every view we can take of it, at least in so far as the evidence has been laid before us, we are led to the conclusion, that this presidentship for life deserves serious consideration.

The remaining points touched on by our correspondents may be divided into two sections; first, those relating to the classification of the members, and the privileges which they enjoy; and, secondly, those relating to the business brought before the society at its professional meetings. Of the members there are four orders: first, "members," properly so called, who are engineers of certain standing, and who are eligible to seats in the council. Our correspondents object to calling these members; and hint that the four letters which express this highest grade admit of a somewhat ludicrous reading. The letters themselves are, M. I. C. E.; and, neglecting the points, small wits make themselves a little merry thereat. The objection to this grade of members is, that many are admitted into it who have no professional title to the name of civil engineers, and with this we shall not in the mean time meddle, farther than to remark that it would be a little incongruous, were a man not a civil engineer to be elected on the committee, or to be eligible as president of this institution. The example of other societies might perhaps indeed be pleaded in justification of this; for there have been presidents of the Royal Society whose claims to be considered philosophers were exceedingly minute.

The next section includes "graduates," or those who are studying or employing themselves, in order to become engineers. Where or under whom they study or are employed, or what entitles them to be called graduates, which means those who are understood to have completed certain studies, we are not informed. The objection to this grade is that, with the exemption of eligibility to the council, they have the same privileges as members of the first grade. This objection may have weight in some cases, and none in others; and therefore we pass it over. The third grade are "associates," or parties not professionally qualified for being regular members, and yet not classible with the graduates. The complaint is, that many gentlemen, actually in regular practice as civil engineers, have been placed in this grade, the privileges of which are of course more limited than those even of the graduates; and that while actual engineers are restricted to this, gentlemen not engineers are admitted full members. These objections rest entirely upon matters of fact, of which the clearest evidence would be necessary before any positive opinion could be given. The fourth and last grade consists of honorary members, who of course may be gentlemen of any profession, or of no profession at all; and thus all that the institution has to do is to take care and not disgrace itself by those whom it honours by this appellation.

The second section of complaints made by our correspondents relates to the professional occupation of the institution at its meetings; or rather the complaint is, that the subjects are not professional enough or of sufficient general importance to occupy the time of so learned a body. This may to some extent be true; but still as the reading of papers, and the exhibition and examination of models, constitute the principal business part, and as first-rate engineers seldom write essays or construct models, we suppose the council must just take what they can get. Such, in brief, are the general points of complaint, and we invite farther correspondence respecting them.

FOUR WHEEL AND SIX WHEEL ENGINES.

[FROM THE APPENDIX TO THE SELECT COMMITTEE'S FIFTH REPORT.]

HAVING been ordered by the Select Committee on Railways to furnish a statement of the reasons why the locomotive engine on four wheels is preferable to the one on six, I beg to submit the following: viz.—

1stly. The engine on four wheels is less costly than the one on six wheels; therefore, to have the same number of engines, or the same power, on a line of railway, less outlay of capital is required.

2ndly. It allows the engine to be got into less space; consequently more compact, firmer, less likely to derangement, and much lighter.

3rdly. Though the engine is lighter, the adhesion is more perfect, from the weight on the driving wheels remaining uniform, however unequal or out of level the rails may be, enabling the maker to equalize the strain and adhesive power at the same time; as it is lighter, there is less power required to take it up the inclines, therefore more available power to take up the train.

4thly. The engine is safer, as it adapts itself better to the rails not being so likely to run off the line at curves or crossings.

5thly. It is more economical in the working, as there is less expense of interest and of depreciation, fewer parts in motion, consequently less friction, or wear and tear, as there are fewer parts to maintain.

6thly. The engine being more simple in its construction, in addition to the advantage of having fewer parts in motion, those parts are more easily got at, therefore much less expense is incurred in those repairs which are common to both plans.

7thly. The buildings, turn tables, and other costly conveniences necessary for the maintenance and repair of the engines, are not required on so large and extensive a scale, as the engine on four wheels occupies much less space than the one on six wheels.

8thly. As there are fewer parts to maintain in the four-wheeled engine, fewer tools, such as lathes, drills, smithies, &c., are required for the repairs of the one engine than the other.

9thly. As the engine is more simple, having fewer parts likely to derangement, there are fewer chances of delays or stoppages during the journeys or the times of taking the trains.

EDWARD BURY.

Clarence Foundry, Liverpool, March 20, 1840.

EXPERIMENTS WITH THE AMERICAN LOCOMOTIVE ENGINE "PHILADELPHIA" ON THE BIRMINGHAM AND GLOUCESTER RAILWAY.

ON Monday, the 10th of August, several experiments were made on the Bromsgrove Lickey inclined plane, on the Birmingham and Gloucester Railway, with the *Philadelphia* locomotive engine, in the presence of the government commissioner, Sir Frederick Smith, and many other gentlemen, including Mr. Shelley of the Treasury, Mr. Amsink, Mr. Henry Woodington, and Mr. Burgess the secretary to the railway company.

The length of the Lickey incline is 2 miles, and the average slope is 1 in 37½. The steepest portion is 1 in 34, and the easiest 1 in 40. The *Philadelphia* engine was made by Mr. W. Norris, of Philadelphia. It has 12½ inch cylinders, a 20-inch stroke, and driving wheels of 4 feet in diameter. These wheels are at the hinder part of the engine, and at the fore part there are four bearing wheels of 2 feet 6 inches in diameter. The engine and tender, including the coke and water, weigh about 19 tons.

First experiment. The load in this experiment amounted to 47½ tons, contained in five carriages, exclusive of the weight of the engine and tender, which, as before stated, amounted to 19 tons. The engine started from the plane of the Bromsgrove station, which is 1 in 300, and after moving about 100 yards on this incline, it commenced the ascent of the steep plane of the Lickey. The distance of 2 miles and one-tenth was performed in 10 minutes, being at the rate of rather more than 12½ miles per hour. In ascending the plane the engine was attached to the hinder part of the train, and four breaks were used for the purpose of retarding the speed. The descent was performed in precisely the same time as the ascent, and the load was 6½ tons more than that which ascended the plane—another carriage having been added to the train at the top of the plane.

Second experiment. On the second trip the load weighed 54 tons, in addition to the weight of the engine and tender. The ascent was on this occasion performed in 11½ minutes—being at about the rate of 11 miles an hour. In ascending the plane, on both occasions, the steam pressure was at about 60lbs., and the engine gradually increased her speed till she reached the summit, where, in consequence of the unfinished state of the work, it was necessary to stop the train. The great desideratum of ascending very steep

inclines at a moderate rate of speed, by locomotive engines drawing heavy loads, would thus seem to be in a fair way of being obtained, but before a definitive judgment can be passed on this very important subject it will be necessary to make trials with this or similar engines in very wet and frosty weather, or during the fall of sleet in the winter. The most important point, however, to be attended to, is the safety of passengers in descending the plane. With careful breaksmen and a sufficient number of breaks there does not appear to be any reason why this plane should not be worked with as much safety as other planes of less severe inclination; and in order to give entire confidence to the public, experiments should be made to ascertain the smallest number of breaks that may suffice to keep the carriages under command, and this number should always be increased in practice. The plane here in question has the advantage of being in a straight line.

Whatever may be the result, it is highly creditable to the engineer of the Birmingham and Gloucester railway to have suggested this experiment, and to the directors to have sanctioned it, for if it should prove to be entirely successful, a great step will have been made towards reducing the cost of railways by diminishing the extent of cuttings and embankments; and, on the other hand, if the application of the American engines to the Lickey incline be given up (which it is to be hoped will not be found necessary), and a stationary engine substituted, no extra expense will be thrown upon the company, as the *Philadelphia* can be used on other parts of the line. The engines chiefly in use between Cheltenham and Bromsgrove, are of American manufacture, and seem to answer admirably for this railway. The average speed between these two places, including stoppages, does not exceed 22 miles per hour, but the velocity on the ruling gradient of 1 in 300 is about 25 miles on the ascending, and 30 on the descending planes.

The rails are partly laid on transverse and partly on longitudinal sleepers, and although the carriages run very smoothly on both, the superior ease of travelling on the latter is very perceptible.

REVIEWS.

"SEVILLE AND ITS VICINITY." BY FRANK HALL STANDISH, ESQ.

We have been presented with glimpses of Seville, and of some of its edifices, in the "Landscape Annual," and in "Roberts' Spanish Sketches;" and we have in this volume a complete history of the city, its topography and architecture, together with notices of its more eminent artists and their works. This publication, therefore, is altogether different from those rambling sketches of local scenery and manners, eked out with personal incidents, that have of late years issued so abundantly from the press, and which are for the most part so heterogeneous in the subjects touched upon by their writers, as to be a medley of almost every thing, from politics and dry statistical topics, down to the scandal and gossip of the passing hour. Here, on the contrary, we meet with nothing of the sort, nothing to captivate or interest those who read chiefly for entertainment, yet much for which the student will feel grateful, should he happen to have occasion for it. The truth is, the book shows Mr. Standish to be by far more of a pains-taking compiler, than a writer gifted with the talent of working up the materials he has collected into an agreeable as well as convenient form. In vain do we look for any of that graphic power of description which marks Washington Irving's "Alhambra," and which in its loose yet felicitous touches, rivals the pencils of Lewis and Roberts; in both cases, more being poetically indicated than actually expressed.

By no means do we impute it as a fault of Mr. Standish, that he has pursued quite a different course, and, dropping all romance, has confined himself to matter-of-fact. Still we could wish that he had recorded the impressions made upon him by such structures as the Alcazar and the Cathedral; the former of which is less celebrated, indeed, than the Grenadan remains of Moorish architecture, but nevertheless a highly interesting example of the style, while the other, said to have been designed by a German architect, passes for one of the finest specimens of Gothic architecture in Spain. Yet, though what is said in regard to these two edifices may seem prolix and technically minute to the general reader, it is in danger of being considered very unsatisfactory and inexact by the architectural one, more especially if, noting down all the particulars mentioned relative to them, he should attempt to frame an intelligible description from them, for he would then instantly discover how very little way they would go towards furnishing one, and how very much more he remains to be informed of. It is impossible to learn, for instance, from the account here given of it, how the celebrated Tower of La Giralda is connected with the Cathedral, or whether it is connected with it at all, whereas, had it been said that it is attached to the north-east angle of the latter, that rather important peculiarity in the general plan would have been clearly understood. Neither is it very much unlike a strange blunder, to describe that tower as being "a *quadrant* of 50 feet in diameter," instead of *quadrilateral* in plan, or a square of 50 feet. Again, though we are told that the Cathedral contains thirty-six columns, composed of groups of small ones, of 15 feet diameter, we are not informed that the interior is in five divisions, there being two aisles on each side of the nave, besides a series of chapels opening into the two outer ones. We are moreover of opinion, that it would have been better in this and some other instances if the writer had first given a complete architectural description of the edifice, and noticed the pictures, &c., afterwards, as by that means a great deal of perplexity would have been avoided.

To say the truth, we are rather puzzled to understand what class of readers — unless, indeed, it be those who intend to visit Seville themselves — Mr. Standish had in view for his book, there being nothing whatever in it to give it any interest for "the million," more especially coming after that volume of the Landscape Annual, which is embellished with the charming plates of La Giralda, the Hall of Ambassadors in the Alcazar, &c., after Roberts' drawings; while, on the other hand, it is deficient in that explanatory description of buildings and critical remark upon them, which would confer upon it interest and value for the architectural reader. It contains, indeed, a good deal of matter relative to the artists of the Sevillian school of painting, and their works, but such information will certainly not procure for it many readers, although it may obtain some purchasers for it, as a book of reference on the subject.

"THE PALACE OF ARCHITECTURE." BY G. WIGHTWICK, ARCHITECT.

SECOND NOTICE. WITH PLATE.

We resume our notice of this work rather more promptly than we first proposed, in consequence of having obtained permission to make use of one of the plates, to which graphic specimen we shall add, as specimen of the literary portion of Mr. Wightwick's book, the corresponding text. It would have been easy to select a plate more striking and novel in subject; for instance that of the "Egyptian Hall," where the polystyle arrangement of the columns produces an effect which Greek examples do not afford. Still we have preferred the group of "Grecian Temples," because it serves to illustrate a style more generally understood, and, oddly as it may sound, illustrates it far more completely than we could wish, since the buildings here brought into juxtaposition, not only exemplify the three orders in regard to their character, but also comprise nearly the whole range of architectural design among the Greeks, which in almost every case exhibits precisely the same disposition of general form and plan, namely, an oblong *cella*, with no other apertures than those forming the entrances, and with no other difference than that the columns are sometimes placed at only one, or else at each end, at others continued along the sides, either *engaged* (or connected with the wall), or so as to form a colonnade or sheltered walk enclosed by columns quite around the building. As to interior architecture, the Greeks appear—as far at least as we are acquainted with their works, — to have had nothing that deserves to be so called, if we except what is of rare occurrence, and by no means of particular beauty, the interior of an hypæthral temple. So far Grecian architecture must be allowed to be decidedly inferior, more limited and *borné*, at least, than that of Rome. In this—certainly not the least important point of view, it is a mere blank; nor has it any thing to rival

GREEK TEMPLES

PUBLISHED BY JAMES FRASER, LONDON.

or even approach the Pantheon and some other structures of the Romans, which present the most attractive combinations of plan. Not to speak it profanely, we might as well look for beauties of this last-mentioned kind in either a barn or a Quakers' meeting house as in an Athenian temple; and though we admire Grecian architecture as far as it goes, we must confess that it goes but a very little way, and that its beauties are of the *toujours perdrix* kind. Canova seems to have been nearly of our opinion, and accordingly did not scruple in the church erected by him at Possagno, to combine the Roman Pantheon with the Greek Parthenon.* Our advice would be, let us study—not copy—rGeek examples for quality of style and details, but let us also study Roman and Italian combinations, and avail ourselves of them freely, selecting and rejecting as circumstances and good taste together shall dictate. This doctrine, however, is not that of our modern *portico-makers*, nor of those exceedingly scrupulous people who would not for the world introduce an arch or any thing of the kind into their *soi-disant* Grecian designs, though they see nothing at all objectionable in sticking up some columns by way of portico to a mere sash-windowed house. It is time to have done with such pedantry, as licentious as it is stupid. But we also ought now to have done, and to let Mr. Wightwick be heard, in his remarks on

GREEK TEMPLES.

"Does not that 'spirit of beauty,' of which we have just spoken, equally show itself in the four varying buildings before you?—in the Herculean strength of the one? the matron dignity of the second? the virgin form of the third? and infantine delicacy of the last?

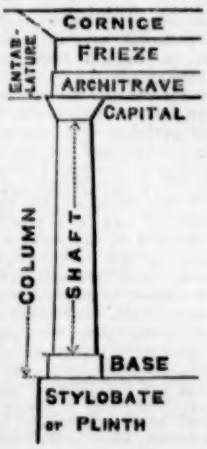
"Before you, on the right, is a *peripteral* temple, i. e., having a projecting colonnade all round the cell or body of the edifice. The annexed figure, taken in connection with the building, will serve to impress upon your memory the general disposition of the *peripteral* temple. The masculine proportions of the columns of this structure, the simplicity of their capitals, and the triglyphs in the frieze, proclaim it a correct specimen of the DORIC Order.

"Near you, on the extreme left, is a *prostyle* temple,—i. e., having columns in front only; the sides of the cell being uncovered and plain. The adjoined figure will aid in the explanation; and it will be understood that, if the portico were repeated at the other end, the temple would then be called *amphi-prostyle*. From the spirals or volutes of the capitals of this example, you at once recognise it as of the IONIC Order.

"The foliated capitals to the columns of the building beyond show it to be an example of the CORINTHIAN Order. This temple is *pseudo- peripteral*, i. e., actually *prostyle*, like its Ionic neighbour, though, geometrically, it exhibits the appearance of a *peripteral* temple, in having the walls of its cell decorated with attached columns, projecting about three-quarters of their diameter from the wall. This fashion, however, is rather Roman than Greek, and is defensible only under rare and peculiar circumstances. The Greeks were by no means given to *pseudo*-splendours.

"The small circular temple in the distance imitates the Choragic Monument of Lysicrates at Athens, an example of what Mr. Hosking, in correction of Vitruvius, properly denominates the *cyclo-stylar*, i. e., 'a structure composed of a circular range of columns without a core.' The Vitruvian name is *monopteral*. It will be observed that the core of the building in question occupies *only a part* of the height, and is not an essential feature in the design. If there were a cell, within, and detached from, the range of columns, it would be a circular *peripteral* temple. When we would confine ourselves to the surrounding colonnade itself, we call it a *peristyle*.

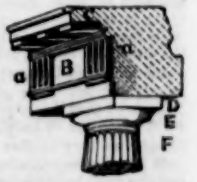
"Referring to the buildings before you, it will be observed that, independently of its plain capital, and its solid proportions, the Doric column is distinguished by having *no base*, whereas the Ionic and Corinthian are never without it. With this exception, each of the three ORDERS has the same number and arrangement of *leading* parts, as you will at once perceive in the annexed cut. The entablature varies in height from one-third to one-fifth of the column; the Doric entablature being never *less* than one-fourth, and the Corinthian never *more*. An *exact* fourth of the height of the column is, perhaps, the best proportion for the Ionic entablature. Of course the judgment of the architect is shown in varying the weight of his entablature agreeably with that strength or lightness, that closeness or extension, which the substance and relative position of his columns may dictate.



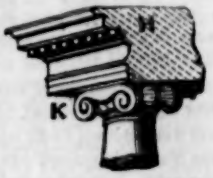
"You observe that, in each portico, the columns are narrower at the top than at the bottom; the upper diameter being about five-sixths of the lower. The Doric column varies from five to six lower diameters in height. The Ionic may be taken at eight and a half diameters; the Corinthian at from nine and a half to ten. In these heights the capitals and bases are included.

"Such are the leading rules which govern the proportions of the three Greek ORDERS. You will not, perhaps, be impatient if we attempt, as briefly as possible, to familiarize you with a few more of the details which distinguish them, one from the others.

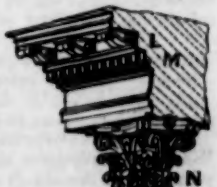
"The *triglyphs*, *a a*, have been more than once alluded to, as only belonging to the DORIC entablature; and you observe that, over each triglyph, as well as over the intervening *metope*, B, there is a plain projecting stone, resembling the end of a flat beam, called the *mutule*, and supporting the chief member of the cornice, viz., the projecting *corona*, C. The Doric capital is always composed of an *abacus*, D, and an *echinus*, E; and though it is sometimes plain the Doric shaft, of which the upper part is seen at F, should always be fluted.



"The cornice of IONIC may be either composed of simple continuous mouldings, as shown in our temple, or, as the writer ventures to think worthy of more frequent attention, *dentils* may be introduced under the *corona*, as shown in the adjoining cut at H. They are so called from their resemblance to teeth; but they in fact typify the ends of joists or rafters. It is scarcely necessary to repeat that the *voluted* capital, K, is the main Ionic distinction. The leading models of this order are the temple on the Ilissus, and the Erectheion of the Acropolis.

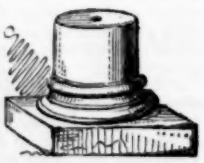


"The CORINTHIAN cornice is sometimes found plain; often with *dentils* only; and more frequently with *modillions*, L, as the sole enrichment. It is suggested that the *modillion* be invariably used as a Corinthian distinction, either plain or foliated, as the richness of the column may require. The adjoining cut shows the application of the *dentil* also at M; and, it is imagined, with good effect. The foliated vase capital, N, is, of course, the leading Corinthian feature,—a beautiful combination of the leaf and volute, which we have before alluded to, as having been hinted at in Egypt.



* Not, indeed, quite so satisfactorily as he might have done, for it must be admitted that the interior of the Rotunda is poor and frigid in design. Almost the only instance of a circular plan being employed by the Greeks, if we except the partial application of it in their theatres, occurs in this very group of temples forming the subject of the plate; yet that is merely a small ornamental structure (since repeatedly *copied*, and often preposterously applied by modern architects), and by no means corresponds in character with the Rotundas or circular edifices of the Romans.

"The adjoining figure represents the lower part of the shaft of a column, with its base, which, it will be observed, is formed of two *torus* mouldings, divided by a hollow, or *scotia*. This is the simpler form of base, but decidedly the most beautiful; and the tori may be enriched or not, as the character of the order may require. The same general form of base is applicable both to the Corinthian and Ionic column.



"It remains to notice that prominent peculiarity which distinguishes the Greek from the Egyptian portico, viz., the PEDIMENT,—the feature, of all others, declaring the cabin parentage, as it typifies the roof of carpentry. A Greek temple without a pediment were as great a rarity as an English house without a chimney.

"It was also the custom to crown the apex of the pediment with a pedestal and figure, jointly designated as the *acroterium*. When statues are also placed over the two lower angles of the pediment, as at St. Paul's, London, 'they may be called,' says Hosking, 'acroteral figures.'

"The annexed figure represents a part of the roof and side of a temple, showing how the eaves-line of the cornice exhibited a series of small upright ornaments, called *ante-fixæ*, from their being fixed against the bottom tiles, so as to stop the openings of the joints; one instance, among many, of the felicitous methods in which the imaginative and judicious Greek made service and decoration go hand in hand. With him, ornament was always expressive, signifying either a practical purpose or an appropriate feeling; rendering constructive necessaries graceful as beautifying appendages, satisfying the eye, by effecting a due balance or uniformity of exhibition; or generating a certain sentiment in harmony with the object and general character of the design. That universal homage which enlightened nations have ever paid to the Architecture of the Greeks, is simply the natural result of its palpable TRUTH,—a truth not only declared by those whose historical and critical education may qualify them to estimate it; but obvious even to others, who may be unprepared with *reasons* for their belief. The distinction between the learned and the unlearned commentator will be this:—the one is acquainted with the *truth* of Greek beauty; the other is intuitively convinced that Greek beauty is *true*. The one knows the original of the portrait; the other is assured that it *is* a portrait. We know that such and such paintings, by Titian and Vandyke, had their originals in the truth of nature, though we may neither have seen nor heard of those originals.

"He, however, who would rival the Greek Temple, must imitate—not the *temple*—but the *Greek:* not the Parthenon, which was simply designed for purposes which no longer exist; but the Architect, whose object was to render his work intelligible as an expositor of his country's religious and intellectual distinction. York Minster is, in *spirit*, more like the Parthenon than any now-erected *fac-simile* of the latter could possibly be."

This last passage is worth a volume, and might almost be expanded into one. "Imitate not the *temple*, but the *Greek:*" that is truly said, and well said, and easily said, George Wightwick,—but where is he that can put such precept into practice? We suspect that architects have not only a very great deal first to learn, but a very great deal first to unlearn also.*

HISTORY OF MODERN ART IN GERMANY;

A REVIEW OF "HISTOIRE DE L'ART MODERNE EN ALLEMAGNE." PAR LE COMTE A. RACZYNSKI. *FOREIGN QUARTERLY REVIEW.*

WE have already given an account of this interesting work relating principally to the schools of Berlin and Dusseldorf, and generally to the recent revival of art in Germany, an event which has excited but little attention in this country, and indeed may be said to be hardly known in its causes and consequences. The present volume treats of the same general subject, and also particularly of the schools of Munich, Stuttgard, Nuremberg, Augsburg, Ratisbon, Carlsruhe, Prague, and Vienna. It comprises a complete account of the recent progress and present state of architecture, sculpture, and painting in these different capitals. It is preceded by an introduction containing the literary history of the Nibelungenleid and the other romantic poetry of Germany's heroic age, from which have been taken some of the principal subjects of the artistic creations formed under the patronage of the present King of Bavaria. The reign of the Hohenstaufen emperors—1138—1268—is the most glorious epoch of the middle age in Germany. In the midst of their deadly feuds with the Guelphs, this noble race of heroes patronized and cultivated the arts and sciences which had sprung into new life from the ruins of ancient civilization. The brilliant and stirring epoch of the Crusades brought the East and the West into contact, and the fruits of this intercourse are attested in numerous monuments of architecture, sculpture, and painting, scattered over Germany, transporting us back to the camps, the courts, and the religious festivals in which the Hohenstaufen appear as the prominent figures on this splendid scene. The poetical productions of this epoch may be divided into three distinct parts: those which have a common character with the Eddaic lays of Scandinavia; those which have borrowed their substance and form from the Romanz poetry; and those which are purely Teutonic in their origin, spirit, and character. The first possess an eminently epic character: they have also a national character, but of that remote nationality which confounds the German race with the other branch of the great Gothic family—the Scandinavians—and which belongs to the bloody period of the Northern mythology. Among these may be reckoned the Nibelungenleid and the other lays of which Theodoric King of the Goths is the hero. The second are of a complex nature, being however mainly derived from the Romanz or Provençal poetry, among which may be reckoned Parcival, Tristan, and the chivalric songs of Wolfram von Eschenbach. The third are purely national, and exclusively appropriated to the age of the Hohenstaufen. Such are the lyric and patriotic songs of Walter von der Vogelweide. These last have no relation to the Romanz poetry, except what concerns their external form.

The poetical literature of this glorious period sprung from the traditions relating to the times of the Nibelungen and Attila, from the lays of the Edda and the other productions of the Skaldic muse. So also the inspirations of modern art at Munich have been mainly derived from the recollections of ancient national glory, of the age of chivalry, and of warm religious faith. The German Nibelungenleid, in its present form at least, is much less ancient than the Scandinavian. It is also much less rude and energetic. It is refined by Christianity and chivalry, both of which were unknown to the ancient Skalds. Its external form has been borrowed from the Romanz poetry, and it may be considered as the commencement of German poetry which has since attained such perfection. The reaction in favour of the romantic school in Germany must be attributed to this source. The lays of the Nibelungs are for the modern Germans what the Homeric poems were for the ancient Greeks. They embody the oldest traditions of the heroic age. To Schnorr was reserved the glory of publishing the Nibelungeleid in a language—that of painting—common to all nations, in a series of frescoes which decorate the walls of the royal palace at Munich. Previous to commencing this great work, he had painted in oil a smaller picture, which is now in the collection of Count Raczynski at Berlin. It represents the bard of the Nibelungen seated between two allegorical figures, Poetry and History (*die Mahre und die Saga*), and forms also the subject of the first of the series of frescoes taken from this poem. This series, like the poem itself, is divided into three principal parts:—the life and adventures of Sigfried, his death, and the revenge of Chriemhild. The execution of this grand conception has not escaped the cavils of criticism, embittered by party spirit and envy; the details of the composition and the figures may not always respond to the preconceptions the spectator may have formed of the scene and characters intended to be portrayed: but the general effect of the whole is worthy of the noble epic from which it is derived.

Another series of paintings in fresco, by Gassen, adorns the walls of the queen's ante-chamber, at Munich, the subjects of which are taken from the life and works of Walter von Vogelweide. This poet, one of the earliest and most famous of the Minnesanger,

* The specimen plan of Greek Temples referred to will be given in our next Number.

flourished during the reign of the Emperor Frederick II. of the Hohenstaufen line. The most remarkable picture in this room is that painted on the ceiling, representing Walter at the famous poetical tournament or trial of skill at the Wantburg, in the year 1286. This celebrated scene is described in an illuminated painting in the magnificent MS. collection of the German Minnesanger in the royal library at Paris. This ancient picture has been copied in a wood engraving by Unzelmann, prefixed to the second volume of Professor von der Hagen's edition of the *Minnesanger*. Gassen has not servilely followed this ancient composition, although he appears to have borrowed some of its details, as characteristic of the times. Walter is represented in the attitude of a conqueror, crowned with laurel before the princely pair, whilst Ofterdingen, his vanquished rival, seeks the protection of the enchanter Klinsor, against that ignominious death which was to be the penalty of defeat in this mortal strife. On the right sit the judges of the field; on the left stands the executioner, holding in his hand the fatal cord; and in the back ground is grouped the crowd of courtly spectators. The minstrel is also represented in various other scenes of his adventurous and courtly life, with that grace and softness which mark the works of this artist. The last of this series represents the tomb of Walter, as it formerly existed at Wursburg. The choristers of the church scatter seeds on the monumental statue of the poet lying in a recumbent posture, which are gathered by the birds invited to this feast according to the legend, referring to his testamentary disposition, which ordained that they should be fed in this manner at his tomb. This beautiful idea is expressed with admirable simplicity and grace in the fresco of Gassen.

The present king of Bavaria, when prince royal, had conceived the idea of erecting a sort of pantheon or temple consecrated to German genius and patriotism. On his way to join the army of Napoleon in Poland, in 1807, he had a conference at Berlin with Johannes von Muller on this object, the execution of which was actually commenced by an order to the sculptor Schadow for several busts of German heroes and authors. On the liberation of Germany from the French yoke in 1814, the design was resumed, and the plan of the architect Klenze was adopted for the construction of the Walhalla, the building of which was commenced in 1820. During the interval between these two epochs, orders were given to Wagner, at Rome, for the bas-reliefs to ornament the frieze, intended to represent the primitive history of the German nation; to Rauch, at Berlin, for six winged victories; and to Schwanthaler, at Munich, for other sculpture, which have been since executed. This monumental edifice is erected about a league from Ratisbon, on the brow of a steep hill, the base of which is washed by the Danube. It is in the form of a parallelogram, 300 feet long at its base, 100 feet wide, and 75 feet in height. It is built of white marble of Salzburg, the lateral walls of the interior being adorned with 150 busts of illustrious Germans of various epochs.

Among the architectural constructions of King Louis at Munich, the Glyptothek is destined to receive the collection of works of ancient sculpture, which is arranged in chronological order in a suite of magnificent apartments, separated in the centre by two square rooms, which are adorned with frescoes by Cornelius. This rich collection was formed by purchases made at Rome, of objects remaining in the palaces of the former electors of Bavaria, and of others excavated at the king's expense in Greece, Italy, and Germany. The frescoes of Cornelius are the most successful attempt to revive this branch of art which has recently been made. The Pinacotheck contains the immense collection of pictures belonging to the king, the productions of each school being arranged in separate rooms. Opposite to the cabinets containing the smaller pictures, a gallery runs along the whole length of that part of the building, divided into twenty-five *loggi*, each of which is painted in fresco on the ceiling and sides with a history of the arts, from designs drawn by Cornelius. The greater part of the cartoons and some of the paintings were executed by Zimmermann, or by other artists under his direction. Their is but one voice as to the beauty of this edifice, both as to its external aspect and internal distribution. The statues of eminent artists by Schwanthaler, to be placed on the roof, will form one of its principal ornaments. The other buildings erected by the king are the new wing of the palace on the south side, ornamented with the frescoes already mentioned of subjects taken from ancient German history and poetry; the new wing on the north side, consecrated to the history of the middle age in Germany, and adorned with paintings arranged in three different halls, the first of which is intended to commemorate the life and actions of Charlemagne; the second of Frederic Barbarossa; and the third of Rodolph of Hapsburg; the chapel of All Saints, built in imitation of the Byzantine architecture, and ornamented with frescoes of religious subjects by Hess; the Basilic, commenced in 1836, and to be finished in 1842, which is also to be decorated with frescoes by the same great master; the church of St. Louis; the Gothic church in the suburb of Au, the most successful attempt to revive the architecture of the middle age we are acquainted with; the Odeon or concert hall; the library and the university. The architects employed in planning and constructing these buildings were Klenze and Gärtner, whose genius has found an immense scope in the execution of such a number and variety of works.

Rauch of Berlin was the first German sculptor, who, after a lapse of 250 years, attempted to revive the taste of the middle age as manifested in the works of Albert Durer. Following neither the models of antique sculpture, nor Canova, nor Thorwaldsen, he succeeded in reviving the true old German style of Fischer, and at the same time adapting it to the present state of intellectual progress and of society, thus producing works which have completely satisfied the public taste and the peculiar wants of the age. Schwanthaler has trod in the footsteps of the great Prussian sculptor, availing himself of the fine field opened by the orders given by the King of Bavaria for the statues of the most eminent masters of painting, intended to ornament the Pinacothek, and for the bas-reliefs on the façade of the Walhalla, representing the combat of Herman against the Romans under Varus. Among the former, the models of Raphael and Michael Angelo are the most beautiful in the judgment of amateurs and of the artist himself, among the great variety of compositions he has produced. His taste in sculpture has evidently been more or less influenced by Thorwaldsen and the study of the antique, but not through a slavish imitation of this master, which would have been unworthy of a genius so original and fertile as that of Schwanthaler.

The school of Munich and the school of Cornelius are synonymous terms. Not that all the artists of this capital are his pupils. Many of them are his contemporaries, and would doubtless have risen to great eminence independent of his guidance and the influence of his example. Still it cannot be denied that his labours have mainly contributed to give a character of originality and grandeur to the school of historical painting which has recently been formed in Bavaria. The powerful genius of Cornelius assumes in his different works the antique or the romantic character according to the respective nature of the different subjects he treats; it is inspired by poetry; the epic is his appropriate field of action. But his style is ever severe, grave, and elevated.

Schnorr is eminently German. The romantic poetry of the heroic and chivalric times has given a fixed direction to his genius. The proofs of this fact abound in his works, which transport us back to the age when poetry, war, love, and religion, were the four elements of human life. His frescoes are admirable for composition, grace, and delicate sentiment. He has occasionally painted in oil colours, but the greater part of his life as an artist has been devoted to the composition of drawings for fresco paintings. He was one of three German artists employed to adorn the villa Massimi near Rome, with frescoes taken from subjects of the three great Italian poets. Those from Ariosto were drawn and painted by Schnorr, from Dante, by Cornelius, and from Tasso, by Ouerbeck. Schnorr was five years engaged in executing his part of this work, which marks the revival of fresco painting on its native soil of Italy by transalpine artists.

Henry Hess, by his natural disposition, is destined to be the painter of the gospel history and other sacred subjects. The religious sentiment is the predominant feature in the character of his genius, which delights in the tender emotions produced by the practice of the Christian virtues. His most important compositions are the frescoes for the chapel of All Saints, representing a series of subjects taken from the Old and New Testament history. Although he was assisted in these paintings by several other artists, and though several of the series were composed and executed by others, the fame of these admirable works of art belong appropriately to him to whom the plan and the direction was exclusively confided

by the king, and who executed the greater part of the cartoons, and more or less of all the paintings. They bear strong marks of analogy with the style of Giotto and the old masters preceding the age of Raphael, and even with the Greek paintings and mosaics of the Lower Empire. This manner of treating the subjects is closely connected with the Byzantine style of architecture employed in the chapel, and contributes to the harmonious effect of the whole edifice. Religion here appears in its primitive simplicity. Its solemnity is divested of all vulgar grace and alloy of human passions. We here discover the eternal type and original character of Christianity, in like manner as the peculiar genius of paganism is indelibly imprinted on the sculptures of Ægina. To have thus revived the spirit of the Gospel history, and embodied it in the language of painting, is indeed a glorious achievement in art.

The school of Munich has unquestionaby been formed by an imitation of the older German and Italian masters. How far this imitation has detracted from the merit of originality claimed for it, and how far it has contributed to develope the peculiar genius of the Bavarian artists, are questions which may suggest some doubts in the minds of those who think that all imitation is injurious to genius, by turning its attention from the original forms of natural beauty to the imperfect transcripts of art. Professor Olivier, the Director of the Munich Academy, has expressed the opinion that the arts, with some occasional exceptions, have been in a constant state of progress and improvement; that the chain of tradition, by which they have been handed down from age to age, has never been entirely broken; and that the period of greatest degeneracy is frequently marked by some redeeming traits, and is connected by some point of excellence with the most glorious epochs in the history of art.

This opinion is contested by Court Raczynski as unfounded in truth and reason.

"I do not see," says he, "for example, what connection can exist, what resemblance can be found, between the paintings of Boucher and the Apollo Belvedere, except that both are works of art, which would be only equivalent to saying, that ever since art has existed, there have been artists, which is too self-evident even to require to be stated, much less to be proved. Doubtless there have been interruptions in the progress of art. The paintings of the Byzantines, as made known to us by Italy, resemble more suspense than progress in art; these paintings were not the production of imagination and taste; they had as little analogy with ancient art as the sculptures of the Mexicans had with Grecian statuary. Strictly speaking the Byzantines were artizans rather than artists. The most glorious periods have not been those which have imitated other periods not less glorious, but have been marked by a return to the original and eternal standards of nature. Cornelius would certainly have been great, without studying the antique. I even esteem him greatest where there are the fewest traces of this study, as for example in his Faust. To be a painter, one must know how to draw, and it is better to draw from good models than from bad. In this respect, copying from antiques, is doubtless useful to students; but to imbibe the spirit of antiquity merely in order to do what its great masters have done, is, I believe, an erroneous course. Still there are examples of genius arriving at great results in following this direction. Thorwaldsen, Cornelius, Schwanthaler, may be mentioned among others. But this principle, carried too far, may rather injure than benefit a school. It cannot be too often repeated, that style is not the imitation of the antique, or of Fra-Bartholomeo: in historical painting it is the grandiose joined to calm simplicity, directed by pure sentiment, and restrained within the bounds of moderation and good taste, whatever may be, in other respects, the species of inspiration which has guided the composition.

"The professors, the greater part of the pupils of the academy, and in general the painters at Munich, are pre-occupied with the idea that style should be the predominant quality in works of art. I am not of the opinion that this should be the object towards which the efforts of the artist ought to be exclusively directed. If the artist be grandiose, if his conception be noble, his works will be stamped with this noble character; but style can no more be attained by effort, than grand and generous inspirations can be found where they are not the natural gift of genius. To those who have not sufficient energy to follow the lofty flight of Cornelius, style becomes affectation. I know more than one artist, whom the pretension to style has ruined. Doubtless beauty of style is inseparable from superiority in historical painting, but it is not necessary to be an historical painter. There are other departments of art in which equal excellence may be attained. To give this direction to talent, not adapted to excel in it, would be as unwise as to require Lafontaine to express himself in the language of Homer, by which epic poetry would gain nothing, and fable would lose much. I have too often seen at Munich, style straining after effect, and aiming at something more than ideal and sublime nature: it then falls into the theatrical and statue-like exaggerations of the school of David. The Germans have an appropriate word by which they aptly express this defect, *stylisiren*, the affectation of style. It is this affectation which I regard as the rock upon which artists of merit are in danger of making ship-wreck.

"The particular direction painting has received at Munich renders the study of subjects indispensably necessary. The life of a hero, or the manners of a nation in remote times, or the conceptions of a great poet, cannot be transferred to the canvas without a profound knowledge of the subjects. But this study and this tendency of the arts have also their perils. The German is naturally prone to abstraction. It is difficult for a painter to satiate his desire to analyze and dissect. It is said to be necessary for the spectator to comprehend quickly and easily the subject of a picture. This assertion appears logically true, but volumes have been written to determine its application. For my own part I do not feel this necessity at the first sight of a work of art. With those who are gifted with a sense of beauty and a love of the arts, emotion always precedes reasoning. Thus when, a spectator at the first sight of a picture begins to analyze its subject, be that assured either he is not endowed with that deep, instinctive feeling, which enables us to comprehend art, or that the work he contemplates expresses nothing. After this feeling has been gratified, it is natural to wish to ascertain whether the subject is well treated; but with a man of taste this criticism will not be considered the most important point; and still less will his attention be first directed to it. I was present when Cornelius, on his return from Italy, in 1835, saw for the first time the cartoon of Kaulbach's great composition of the *Huns*. He contemplated this picture in silence, and fully recognised its beauties previous to understanding the thought which predominates in its composition. After having paid his tribute of admiration to its design and execution, he then questioned his pupil as to the subject. Yet the conception of the artist is rendered in this picture with remarkable distinctness."

Cornelius was born at Dusseldorf. His father was inspector of the Electoral Gallery, was not rich, and had a numerous family. His earlier years gave promise of talent in the art of drawing, which induced his parents to place him as a pupil in the academy.

"I was in the sixteenth year of my age," says he, "when I lost my father; my elder brother and myself were obliged to provide for a numerous family. It was at this period that my mother was counselled to bind me apprentice to a goldsmith, rather than make me a painter, on account of the great length of time required to attain eminence in the art of painting, and the multitude of competitors for public favour. My good mother rejected this advice, and I was buoyed up by the enthusiasm of youth which her confidence confirmed, and which was stimulated by the dread of being torn from my favourite art. I thus made rapid progress, and gave early promise of greater excellence than I have ever been able to attain."

He studied the works of the old masters, not with a view to servile imitation, but in order to imbibe the spirit of their style. The paintings on the walls of the church at Weiss, near Dusseldorf, form his earliest important work. The figures are colossal, and painted *en grisaille*. The artist was then only nineteen years old. Though imperfect, these works indicate that energy which is the distinguishing mark of his talent; they also denote the study of Raphael.

At the age of twenty-six his genius took a new direction, and developed itself in a series of compositions from Faust. The excellence of these works is quite independent of any aid derived from the study of the antique. The subjects are taken from the poem of Goethe, but Cornelius has breathed into them new life. These compositions are eminently German. They were executed at Frankfort, and have been engraved by Ruschweigh. Among them, the prison-scene of Gretschen, and that where Faust and Mephistopheles are described riding on coal-black steeds by the place of execution, are inspired by the very genius of German romantic poetry. The terrific sublimity of the latter scene is admirably depicted in a fine wood engraving by Wright and Folkard, which embellishes the volume before us.

After completing these compositions in 1811, Cornelius left Frankfort for Rome. On arriving there, he found his countryman Overbeck already established, and a close friendship was soon formed between the two younger artists. They inhabited an old deserted convent, where they worked separately from morning to night, communicating the results to each other at the end of every

week, and imparting in a friendly spirit their mutual criticisms. A numerous colony of German students was soon gathered in the capital of the arts, who mutually sustained and encouraged each other's efforts. Cornelius himself speaks with proud exultation of their success, in aiming at a point of excellence not yet attained.

"It would be impossible," says he, "briefly to describe the circle of developement which took place at Rome whilst I resided there; but I may hazard the assertion, that it comprised centuries of real progress. I speak not of myself alone, but of that cluster of individual talents and characters, animated by patriotic, pious, and generous sentiments, elicited by the enthusiastic struggle already begun against tyranny and frivolity, both in Germany and among our countrymen in Italy. Every noble nature powerfully felt the impulse of this reaction."

Cornelius employed himself at Rome on compositions from the Nibelungenleid. These cartoons have been partly engraved by various artists, but the "Departure of Siegfried," one of the finest of the whole series, had never been engraved until it was lithographed by Zach of Munich for Count Raczynski's work. It forms part of the cahier of prints accompanying the present volume. The cartoons of the "Meeting of Joseph and his Brethren," and "Joseph interpreting the Dream to Pharaoh," belong also to this epoch of Cornelius' career as an artist. He afterwards executed the drawings to illustrate the Divina Comedia of Dante. In this work he may be said to have laid aside his own crayons, and borrowed those of Giotto and Fiesole. These compositions are marked by a purity of sentiment, softness, and calmness of manner, which contrasts with the usual energy of his style. The figures of Adam, Moses, and Saint Stephen, are remarkable for simplicity and calm grandeur; whilst the scene in which Dante and Beatrice present themselves at the gates of Paradise is distinguished for grace and purity. During this period the prince royal, now king of Bavaria, arrived at Rome, and made himself acquainted with the fertile and powerful genius of Cornelius, whose aid he invoked to accomplish that restoration of the arts which the prince had already projected. In order to devote his whole time and attention to this object, Cornelius resigned his place of Director of the Academy at Dusseldorf, and emigrated with a colony of pupils to Munich. Here, he devoted ten years of his life, from 1820 to 1830, in the maturity of his age, and full vigour of his talent, to designing and executing the frescoes of the Glyptothek, from appropriate mythological subjects of the Homeric poems. This series was followed by the History of Painting, which adorns the *loggi* in the picture gallery of the Pinacothek. The drawings for these frescoes were executed by Cornelius. He also prepared the immense cartoons for the frescoes in the church of St. Louis. Among the subjects of these are the "Last Judgment," the "Adoration of the Magi," and the "Crucifixion," the two last of which are engraved on wood; the "Adoration," by Andrew, Best, and Leloir; and the "Crucifixion" by Lodel at Göttingen. The tendency of Cornelius in these works is at once epic and symbolic. In treating religious subjects, he not only retraces the facts as recorded in Scripture, but impresses upon them a certain mysterious character, by surrounding the principal action with a whole world of allusions which suggest deep reflections to the pious mind. The religious sentiment and the character of the evangelists, are expressed in a language at once new and full of energy.

The merit of Cornelius, as a reviver and continuator of art, cannot be better summed up than in the words of a letter addressed to him in 1828 by Girard, himself a great artist and critic, whose enlightened judgment is delivered with a noble simplicity, without the slightest taint of envy or jealousy.

"You have discovered the means of restoring to art her ancient life, and Germany will be indebted to you for having accomplished all that the fourteenth and fifteenth centuries had promised to bestow on her. This revival will be durable, for it is founded on truth, with which the ancients were so deeply imbued. It will be durable, because it is in accord with the manner, spirit, and literature of your age; and in this respect will this reform vary from changing modes, which in other countries have often modelled art, without impressing on it lasting characters."

Among the numerous colony of artists who emigrated with Cornelius from Dusseldorf to Munich was Kaulbach. Few men of genius have struggled through such difficulties in early life. His first essays in art were paintings for churches, for which he was very badly paid. For one of these, a Madonna with the infant Jesus, of the size of life, and painted for a church in Westphalia, he received only forty thalers. He was also commissioned to paint the walls of a chapel belonging to an asylum for the insane near Dusseldorf, for which he merely received a bare subsistence whilst employed on the work. Whilst his mind was thus depressed by the evils of poverty, the sight of these unfortunate beings left a deep and lasting impression, the recollection of which haunted him for fifteen years, until he made it the subject of that fine composition which has been engraved by Meerton, and of which a wood engraving by Wright and Folkard forms a part of the illustrations of the present volume. Kaulbach afterwards executed a series of drawings illustrating the story of Schiller's "Verbrecher aus verlorner Ehre," in the style of Hogarth, a specimen of which forms part of the separate cahier of prints. He also executed a series of paintings for the royal palace at Munich, from the works of Goethe, which represent not merely scenes and passages from this great poet, in which the original idea is taken by the artist as the germ of his conceptions, but conveyed in a style entirely new and original. The latest and most remarkable of his compositions is the "Combat of the Huns," painted for and now in the collection of Count Raczynski, at Berlin, a fine engraving of which by Thäter accompanies this volume of his work. This subject is painted *en camieux* in a large picture of twenty-one feet by seventeen, and of which the figures in the foreground are of the size of life. This sublime composition is above all praise, and may be placed among the greatest works of modern artists. It was intended to be executed in colours, but the impatience of the person by whom it was ordered to possess the work, obliged the artist to relinquish his intention. We are however of the opinion that it would have lost more of that undefinable character of mystery and grandeur which now belongs to it, than it would have gained in any other respect by being painted in colours.

The legend which forms the subject of this picture is the most striking scene furnished by the struggle between the expiring genius of ancient Rome and one of those hordes of barbarian invaders, who, after having ravaged and subdued the provinces, attacked the capital of the empire, A. D. 242, under their great leader Attila, king of the Huns. History says that Leo, the venerable bishop of Rome, came out to meet this monarch, bearing gifts, and accompanied by the senators, beseeching him to spare the city where the Apostles had preached, and which Alaric had not violated. Attila was moved, and drew off his army from Italy laden with spoil, to pasture their herds once more beyond the Danube. But the carnage and devastations already perpetrated by the Huns left a profound impression on the popular imagination; which, as Chateaubriand remarks, "avait invente une histoire qui semble etre l'allegorie de toutes ces fureurs et de toutes ces exterminations." In a fragment of Damascius it is related how Attila gave battle to the Romans at the gates of Rome; the armies on both sides perished in the fight, with the exception of the generals and a few of the common soldiers. As they fell, the bodies of the slain rose and continued the combat in the air with unmitigated fury during three days and nights.* It is the allegory contained in this popular legend which has been transfused into the expressive language of painting by Kaulbach, with this happy deviation from the original, that he has not separated the soldiers from their generals. The majestic figure of Attila is seen in the foreground, borne aloft on a shield by his followers, and leading on his faithful Huns to renew in the air the battle with the Romans which had been commenced on earth.

The academy of Munich and the school of Munich are two distinct objects. By the school is understood that aggregation of historical painters whose talents have been developed under the influence of Cornelius, and upon whose works his powerful genius has impressed a character of grandeur common to them all, and which distinguishes them from the productions of all other German artists. The academy is also under the direction of Cornelius, but the artists formed by his example do not all recognise the supremacy

* "Commissa pugna contra Scythas ante conspectum urbis Romæ, tanta utrinque facta est cædes, ut nemo pugnantium ab utraque parte servaretur, præter quam duces paucique satellites eorum: cum cecidissent pugnantes, corpore defatigati, animo adhuc erecti, pugnabant tres integras noctes et dies, nihil viventibus pugnando inferiores, neque manibus neque animo."

of the academy. The academy derives its moral being from the school, and not the school from the academy, as grammar springs from languages, the rules of which they teach without creating these rules. In the academy resides the conservative and regulating principle of the arts, but the creative and life-giving principle, which is so powerfully at work at Munich, must be sought for elsewhere. As to the models which are proposed for the imitation of the students of painting, they are principally the works of the old masters anterior to Raphael. As already intimated, the professors act upon the principle, that the arts in their progress form a continuous chain, which cannot be interrupted without danger to their perfection. Such, in fact, has been the progress of modern art in Germany. First came the study of the antique, then followed that of the old German and the grotesque; at last each artist entered on the path which was pointed out by his own natural genius. Such has been the course pursued by Cornelius, Wach, Begass, Schnorr, and many other of their rivals. And such, according to our author, is the correct course.

"Art," says he, "ever tends to pass the bounds of taste and moderation; the greatest masters of the classic age appear in their earliest works timid and naïf, and it is only by degrees that they attain those extreme limits in the perfection of art beyond which lies the domain of bad taste and exaggeration; but those who have attained these limits at a single bound have soon overpassed them. The grave and grandiose character of which the external forms of the master-pieces of antiquity furnish examples, produced certainly the best models for forming the taste and for attaining a firm and pure style of drawing. The study of the works of the Italian painters anterior to Raphael is adapted to preserve young artists from the influence of rashness, presumption, and negligence; it tends to preserve the purity of the imagination, to develope the internal emotions, and that calm serenity of soul inspired by religious sentiments which have ever exercised the most beneficial influence on the art of painting. It is, therefore, that I object to the principle of the academy only when it is pushed to its extreme consequences. When it is carried too far, I should say that it is in vain to attempt to limit the action of a talent endowed with great force, which is completely developed, which is imbued with the consciousness of its own power, and possesses adequate means of expressing with energy a great conception. It should then be left to its own free action, and if it produces great and beautiful works, the models of which are not to be found in the productions of preceding artists, its merit is not the less in my eyes for being original. Uhland has well remarked, that there is an intimate connection between the different species of poetry, but it is at the same time undeniable that there exists a creative power, which acts independently of models, and continually produces something new. The art is transmitted from generation to generation, but there is also for poetry an independent field of action in which great talents may freely move. With a similar modification the principle of Cornelius and the academy may be admitted. But, as already observed, I am firmly convinced that the study of Giotto, Fiesole, Perugino, Francia, cannot but be favourable to promote the progress of the student in the early part of his career. It serves to check the tendency to those exaggerations of force and grace which form the besetting sin of youthful artists."

We are informed, but we know not on what authority the assertion rests, that Cornelius has been applied to to paint the frescoes in our House of Commons. We trust, as England has no fresco painter, that a mean jealousy of foreign genius, before which our own stands rebuked, will not obstruct this truly generous and noble appreciation of this distinguished artist.

INSTITUTION OF CIVIL ENGINEERS.

Continued from page 164.

Feb. 25, 1840,—the President in the Chair.

"On the Improvement of Navigable Rivers, with a Description of a Self-acting Wasteboard at Naburn Lock, on the River Ouse." By Henry Renton, Grad. Inst. C. E.

Previously to the year 1834, the navigation of the river Ouse from Selby up to Boroughbridge, a distance of 39 miles, was much impeded by a number of shoals or "huts," some of them of considerable extent—all vessels drawing more than five feet water being compelled to await until the spring tides set in, so as to afford them sufficient depth of water. Mr. Rhodes was consulted as to the best mode of obviating this difficulty. He recommended the employment of a steam dredging-machine to deepen the bed, by removing the shoals, and the construction of a self-acting wasteboard on the dam, so as to give an additional height of water at Naburn and Linton Locks, as it was found that no injury could occur in the adjacent lands from the level of the river being raised 18 inches.

The greater part of the shoals consisted of compact blue clay, with a mixture of gravel and large boulder stones, and, in a few instances, of oak trees, such as are found near the bottom of bogs.

To use the dredging-machine in the most advantageous manner, the principle of the sliding tool in a turning lathe was adopted, by running the machine across the face of the shoal from side to side of the river, without altering the position of the lower tumbler. This method produced a perfectly even horizontal surface of the bed, and prevented subsequent accumulation. The whole of the shoals were thus removed, so that sea-borne vessels and steamers, drawing from 11 to 12 feet water, could at all periods navigate to York, a distance of 80 miles from the Humber. It was still necessary to raise the height of the water at least 18 inches between Naburn and Linton Locks, to enable vessels drawing seven feet water, to pass at all seasons from York up to Boroughbridge, a farther distance of 20 miles. To accomplish this, the self-acting wasteboard was constructed.

It is composed of two distinct boards of Memel timber, each 76 feet long, 18 inches high, and 4 inches thick, placed on the top of the angular face of the dam. It is fixed by means of strong wrought-iron hinges, leaded into the stone work at intervals of 10 feet. Over the hinges are fixed wrought-iron bolts, one inch diameter, connected by flat chains with the plimmer blocks on a line of shafts extending behind each board on the face of the dam; on the ends of these shafts are fixed spur-wheels working into pinions which drive pulleys, over which run the chains supporting the balance weights, which are hung on the face of the wing walls. When the balance weights are at the bottom of the walls, the wasteboard will be in an upright position, which occurs when the surface of the water does not rise six inches above the top of the boards, or two feet above the dam; but when, on a sudden increase of the volume of water, there is a considerable pressure on the face of the wasteboard, it more than counterbalances the weights, and causes the boards to incline towards a horizontal position, at the same time raising the balance weights and allowing a free passage for the water. When the pressure diminishes the weights descend, and the boards resume their vertical position.

The time occupied in dredging the river and constructing the wasteboards was two years, and the cost of the latter, which was made by Messrs. J. and W. Lailder, of York, was £300.

The result of these alterations has been most satisfactory, as since their completion not a vessel has been detained in the upper level, and the registers of the heights of the water at Linton and Naburn Locks, and York, show that the winter floods have not risen to such a height, or continued for so long a period, as previously to the improvements being carried into effect.

"On the autogenous uniting of Lead and other Metals." By M. Delbruick.

The term "autogenous" is employed by the inventor, M. de Richemont, of the method now described, to designate the union of pieces of metal of the same kind with one another without the intervention of the ordinary alloys of tin or other connecting medium. This is effected by directing, by means of a fine beak, the flame of a jet of hydrogen on the parts to be united. A complete fusion of the metal is thus effected, and the parts are united in one homogeneous mass, the metal at the points of junction being in the same state chemically as at the parts untouched. Plates of any thickness, whatever the direction of the edges to be joined, may thus be perfectly united, and the lines of junction made as strong as the rest of the mass. Many circumstances contribute to render the joints made with common solder objectionable. The rates of expansion and contraction on changes of temperature for lead and its alloys with tin are different; some chemical agents act much more on alloys of lead and tin than on lead alone. The alloys also are fragile, and the solder may not perfectly attach itself, without the imperfection being observed. In addition to obviating these objections, M. de Richemont conceives that his new method of union possesses the farther advantages of economy, in saving of solder and in avoiding seams and overlappings; in permitting the use of thinner lead and the use of lead where it is now inadmissable, and in rendering practicable the repairs of vessels which are now impracticable.

M. de Richemont also applies this jet of flame to heating the common soldering irons used by tinmen and plumbers. The jet is permitted to play upon the tool, which in a few seconds is brought to the requisite heat, and maintained at that heat without any injury to the tool. The heat can be regulated to the greatest nicety by diminishing or increasing the jet. The author conceives that the sulphate of zinc produced in the manufacture of the gas will be found of such value as greatly to diminish the cost of this process.

March 3, 1840.—"Description of the 'Nonsuch' Iron Passage Boat plying on the Limerick navigation, between that place and Killaloe." By Charles Wye Williams. Assoc. Inst. C. E.

The attention of Mr. Williams having been attracted to the successful plan for the conveyance of passengers adopted on the Glasgow and Paisley Canal, where light sheet-iron boats of great length travel at a speed of nine miles an hour, he was induced to attempt the introduction of the same system on the Irish canals. A great difficulty, however, presented itself, as the locks there would only admit boats 60 feet long, which length was quite inadequate to the carrying out with advantage the principle involved in the long light Scotch boat. To overcome this difficulty, he constructed a sheet-iron boat, 80 feet long and 6 feet 6 inches wide at midships, having the stem and stern ends (each 10 feet long) attached by strong hinges to the body, and susceptible of being rapidly raised to a vertical position by means of winches; thus reducing the length to 60 feet when required to pass through a lock. It is evident that by this means there would be gained not merely the apparent additional buoyancy of 10 feet at each end of the boat, which from the form would not be very effective, but in reality the buoyancy due to an addition of 20 feet of the midship section. The boat thus constructed has been found to answer perfectly; the buoyancy is equal to that of Scotch boats of similar dimensions; no crankness or unsteadiness accrues when the ends are raised; it is capable of carrying 60 passengers, travelling at a speed of 9 miles per hour, with the same power that was required to draw a 60 feet boat with a less load, and there is a much less action on the canal bank in consequence of the increased length, which at the same time imparts stiffness, and enables passengers to enter and leave the boat with safety. Considerable time is saved in passing the locks, by the opposition of the square end when the bow is raised; the boat may thus be run almost at full speed into the lock, and both ends being raised simultaneously, it is stopped much more easily than if the tapered ends were down. No provision is necessary for keeping the ends down, as the weight of the bow and steersman answers the purpose. This boat has been working without intermission for three years, between Limerick and Killaloe, traversing twice daily a distance of 15 miles on a navigation of considerable intricacy, and passing 11 locks, without any accident having hitherto occurred.

"Description of a Running Gauge for ascertaining the Parallelism of a Railway." By Edward Cowper.

The construction of this gauge somewhat resembles that of a truck, having two grooved wheels made to fit the rails on which it travels. It has two axles, one of them fixed and the other moveable, so as to accommodate itself to any variation in the width between the rails: to the end of the moveable axle is attached an arm, which, by its vibration across a dial, points out the degree of irregularity in the parallelism of the lines of rails. It can be used by hand or attached to the end of a train of carriages, and is intended as a rapid mode of detecting any irregularity in the railway.

"An Azimuth Cap as an addition to the common Level." By Edward Cowper.

It is sometimes desirable in levelling operations to ascertain the bearing of objects which are either above or below the field of view of the telescope. The common level alone cannot take the bearing of such objects; for, by elevating or depressing the telescope, the action of the compass is destroyed; but, by slipping the Azimuth Cap on to the end of the telescope of the level, objects 50° above or below the field of view may be observed without disturbing the compass or altering the level of the telescope. This instrument consists of a brass cap containing two slips of looking glass placed at an angle to each other, precisely as in Hadley's quadrant; one glass being fixed at an angle to the axis of the telescope, and the other being moveable about a centre. When any object is required to be brought within the field of view, the cap is placed on the end of the telescope, and the angle of the moveable glass is varied until the object is reflected on the fixed glass, and thence to the eye.

March 10, 1840.—"A mode of bending Discs of Silvered Plate Glass into concave or convex Mirrors by means of the pressure of the Atmosphere." By James Nasmyth.

The difficulty of obtaining large specula for telescopes, together with the disadvantages attending the weight, the brittleness, and liability to oxidation, of the speculum metal generally used, induced Mr. Nasmyth to turn his attention to the employment of silvered plate glass for telescopic purposes, as it possesses perfect truth of surface, is lighter than metal, is not liable to oxidation, and a greater quantity of light is reflected from it than from any metallic surface. To give a concave or convex form to a disc of plate glass, a certain pressure must be made to act equally over the surface. This equal pressure is obtained on Mr. Nasmyth's plan, by taking advantage of the weight of the atmosphere.

A disc of silvered plate glass, 39 inches in diameter, and 3-16ths of an inch in thickness, is fitted and cemented into a shallow cast-iron dish, turned true on its face so as to render the chamber behind the glass perfectly air tight; by means of a tube communicating with this chamber, any portion of air can be withdrawn or injected. To produce a concave mirror so slight a power is required, that on applying the mouth to the tube and exhausting the chamber, the weight of the atmosphere, which amounts in this case to 3558 lbs., acting with equal pressure over a surface of 1186 square inches, causes the glass to assume a concavity of nearly three quarters of an inch, which, in a diameter of 39 inches, is far beyond what would ever be required for telescopic purposes. On re-admitting the air, the glass immediately recovers its plane surface, and on forcing in air with the power of the lungs, it assumes a degree of convexity nearly equal to its former concavity. The degree of concavity or convexity may be regulated to the greatest nicety, and it is proposed to render the degree of concavity constant by placing in the air-tight chamber a disc of iron turned to the required form, and allowing the pressure of the atmosphere to retain the glass in the form given to it by its close contact with the iron disc. The curve naturally taken by the glass when under the pressure of the atmosphere is believed by Mr. Nasmyth to be the catenary, inasmuch as its section would be the same as that of a line supended from each end, and loaded equally throughout its length.

March 17, 1840.—An Account of the Performances of the Locomotive Engines on the London and Birmingham Railway during the year 1839." By Edward Bury, M. Inst. C. E.

The engines used on the London and Birmingham Railway are all constructed on the same principle as to the main parts, the whole being upon four wheels, and only differing from each other in some of the minor details. The engines used for the conveyance of passengers have cylinders 12 inches diameter, with an 18-inch stroke; the driving wheels are 5 feet diameter, and the carrying wheels 4 feet diameter. The merchandise engines have cylinders 13 inches in diameter, with an 18-inch stroke, and differ from the others in having all the wheels of 5 feet diameter and coupled together. The framing is of wrought iron, fixed inside the wheels for the greater convenience of connecting it with the boiler. The cylinders are attached to the frame by two strong wrought-iron bars passing beneath the lower semi-diameter, and secured by bolts to the ears cast on them. The cranks and fore-axles are also fixed to the frame. By this arrangement, any concussion is received directly by that part of the machine best calculated to bear it, and when the force of the engine is exerted in either pushing or drawing, it is done directly through the line of the framing, and thus any strain is diverted from the boiler or from those parts of the machine liable to be injured. There are only two bearings on the axles, and they are inside the wheels. Any tendency towards depression in the centre from the weight would be counteracted by the continual upward pressure, arising from blows received by the flanch of the wheels striking against the rails on curves, passing crossings, &c. The bushes which the axles run in are fitted into the frame in such a manner as to allow the springs to play vertically, but have flanches which prevent any tendency to lateral action beyond that necessary for the irregularities of the road, and they are of such a length as to enable them to hold up the engine in case of the breakage of one of the axles. It would appear that the breakage of the axles is a very rare occurrence, and that even when it has happened, the engines have performed the remainder of the journey and brought home the train with only a slight diminution of speed. The engines differ in weight according to the class they belong to. A passenger engine, with its coke and water in the fire-box and boiler, weighs 9 tons 13 cwts. 1 qr.

	Tons.	cwts.	qrs.
The fore end	3	19	1
The after end	5	17	2

A merchandize engine, with coke and water, weighs 11 tons, 13 cwts. 1 qr.

	Tons.	cwts.	qrs.
The fore end	5	4	1
The after end	6	12	3

This form of engine was adopted by the author as early as the year 1829, when he constructed the "Liverpool," which was the original model engine with horizontal cylinders and cranked axles. It was set to work on the Liverpool and Manchester Railway in July, 1830. This form of engine has been invariably used on the London and Birmingham Railway since its opening.

The performances of the engines extend over a distance of 700,000 miles, and a period of twelve months; and it appears that with the passenger engines—

For the first six months the average total cost of conveyance was $\frac{999}{1000}$ of a penny per ton per mile.

For the second six months the average total cost was $\frac{999}{1000}$ ditto.

While with the merchandize engines—

For the first six months the average total cost was $\frac{803}{1000}$ ditto.

And for the second six months the average total cost was $\frac{827}{1000}$ ditto.

"Earth Falls at the Undercliff in the Isle of Wight." By William Rickman.

The remarkable tract of coast called the "Undercliff" extends from the south point of the Isle of Wight, nine miles to the eastward. Its surface is distorted in form, somewhat resembling in miniature the volcanic features of Southern Italy; for although the latter has been formed by the action of fire, and the former by that of water, both have been moulded when in a state of partial fluidity. The soil is of a boggy nature, is intersected with numerous springs, and in it are imbedded in the utmost confusion detached masses of the weather-worn cliff rock, forming in places natural terraces on the face of the cliff, and inclining inwards at different angles towards the land.

A sectional view taken through the south point, bearing north to the summit of St. Catherine's Down, would present these features.

From the sea beach of iron sand, strewed with shingle and boulders, rises a cliff of 60 feet, and from it a rugged and irregular ascent of 320 feet in height, half a mile in extent, composed of vegetable soil, chalk, green sand-stone in masses and fragments, and of blue marle, the whole mingled indiscriminately and irrigated by numerous springs. Thus much constitutes the "Undercliff." Above it appears the perpendicular, serrated profile of the Upper Cliff, 260 feet in height, from which the surface of the Down proceeds with a slight descent for a quarter of a mile, and then gradually rises in the extent of half a mile to a vertical height of 200 feet, being the highest land in the island—780 feet above the level of the sea. The strata are nearly horizontal, with a slight dip to the north-east. They are the upper part of the secondary or supermedial order, and consist of chalk, chalk-stone, green sand-stone, blue marle, and iron or red sand.

This stratification would account for the subsidences of the Cliff which have occurred so repeatedly. The water collected by the extensive surface of the Down would percolate through the chalk and sand-stone beds until it reached the impervious blue marle, where it would accumulate until it finally escaped by oozing out over the edge of the stratum, carrying with it portions of the sandy subsoil; in this state it has the appearance of a slimy grit, consisting of particles of the sand-stone lubricated with clay: it is familiarly called "the blue slipper." A continuation of this infiltration for any length of time must end by undermining certain portions of the face of the Cliff, which, being unsupported beneath, detach themselves from the main rock and settle; the first settlement may not exceed a few inches, but a fissure having been formed the whole length behind the subsidence, the surface water pours into it, and continuing to moisten and undermine it, at length causes the slip to assume its present aspect. This soakage of water at the back of the mass may be supposed to sap its foundation at the rear, and to give it the dip inwards, which is observed in all cases, and most evidently in such as are farthest advanced in their descent. A number of natural terraces are thus formed, and the process may be traced in every stage of its progress at different parts of the Cliff, as at Mirables, in the Pelham Walks, at Ventnor, and at the Luccombe landslip. These subsidences appear to have succeeded each other at long intervals of time, but there is no record of any so extensive as that which occurred in 1799, at which time upwards of 100 acres were set in motion. That the principal landslips took place prior to the Norman Conquest is proved by the existence of Bonchurch and St. Lawrence Chapel, which are supposed to have been built soon after the manor was surveyed for entry in Doomsday Book.

RECORD OF PUBLIC WORKS.

Railway in America.—The railroad from Taunton to New Bedford was opened on Wednesday last, with appropriate festive ceremonies. The distance from New Bedford to Boston by this line of road is 55 miles, viz., from Boston to Mansfield, 24; Mansfield to Taunton, 11; thence to New Bedford, 20. From Taunton to Mansfield the distance was run in twenty-two minutes, and thence to Boston fifty minutes, making the whole time of running a little short of two hours.—*New York Morning Herald*, July 4.

Vale of Glamorgan.—We understand that a railway is contemplated along the Vale of Glamorgan for the purpose of opening up a district abounding in coal and iron. The line has already been surveyed and a highly favourable report received from the engineer, a gentleman of talent and experience. This affords another proof of the rapidly increasing importance of the county of Glamorgan. Plans for another line, to be called the Swansea Vale Railway, have been deposited, and the project will probably come before Parliament next session. Mr. Bush is the engineer of the latter line.

Communication with Glasgow.—In consequence of the opening throughout of the Ayrshire Railway, Glasgow, is now placed within 24 hour's distance of London, and the Directors of the Company by the recent purchase of the *Fire King* steam-ship, which is to run three times a week from Ardrossan to Liverpool, have pretty nearly *secured* this line of communication. The train leaves Glasgow at 4 p.m. in time for the steamer from Ardrossan at 6, which in 13 hours will be in Liverpool, so as to meet the southern trains which bring the passengers in 9 hours to the metropolis. The *Fire King* is well known to be the fastest, and one of the most splendid ships on the west coast, and can easily make the passage within the time.

Glasgow, Paisley, and Greenock Railway.—We are happy to learn that the Directors of the Glasgow, Paisley, and Greenock Railway, intend to open the line between Port-Glasgow and this on the 1st of September. We have also heard that it is the intention of the Directors to open the whole line next month. Only a mile will then remain to be finished at Bishopton, and this little gap can easily be done by omnibus in 7 minutes. The whole journey will not occupy more than an hour and a quarter, and possibly less, and although some inconvenience will doubtless be felt from the change of conveyance, yet we are satisfied that the great saving in time will secure a considerable part of the trading community. There seems no doubt that the tunnels will be ready in November, and thus the arrangement will be only very temporary.—*Greenock Advertiser*, August 18.

Railway and Canal Travelling between Edinburgh and Glasgow.—On Thursday last, the 20th ult., the Directors of the Slamannan Railway, along with a number of Shareholders, some of the Directors of the Union Canal, and several practical engineers, took an excursion along the Glasgow and Garnkirk, the Monkland and Kirkintilloch, the Ballochney and Slamannan Railways to Causeyend, near Linlithgow, on the Union Canal, and thence by the Union Canal to Edinburgh. The party left Glasgow at five minutes past eight o'clock in the morning, and reached Causeyend at twenty minutes before ten. By one of the swift passage boats the party was conveyed from Causeyend to Edinburgh in two hours and a half; the whole journey from Glasgow to Edinburgh being thus performed in four hours with the utmost ease and pleasure. We understand that this route to and from Edinburgh will be opened to the public next week, when a speedy, safe, agreeable, and cheap communication with the metropolis, will be opened up to our fellow-citizens.—*Glasgow Courier*.

Kingston-upon-Railway.—The history of this beautiful little town in embryo, we believe, is not generally known. It is situate near Kingston-upon-Thames, under cover of the adjoining hills, not unlike Bath, and is the first station of the Southampton Railway. Two years ago the executors of a gentleman possessing 100 acres of land, gave out that they should advertise them for sale by auction. Mr. Pooley, a malster in the neighbourhood, felt an inclination to be the possessor, and offered £7,000, but he was told the upset price was £10,600, £2,000 of which he immediately deposited. This was no sooner done than £7,000 were offered for his purchase, then £26,000 then £60,000, and finally by some *quidnunc* in the city, £120,000, at an interview with whom, Mr. Pooley assured him to his astonishment and surprise, that he had offered about one-half of what he would take. He immediately set about building and letting out the land; and some beautiful villas and lines of commodious houses have been erected within eighteen months, and in a short time, we understand, 800 houses will stand upon the ground. Mr. Pooley has liberally offered ground as a site for a church and minister's house and garden, and £500 to make a beginning. New Kingston is 10 miles from London, which is run on the railway in from twelve to fifteen minutes. The salubrity of the air may be appreciated from the following circumstance:—At an assembly of twelve inhabitants of alms-houses, their united ages amounted to 1,072 years.

Lancaster and Preston Railway.—The railway is now, in the second month of its opening, paying five per cent., although as yet little has been done in the way of the conveyance of heavy goods. Under these circumstances shares are looking up, and little doubt is entertained that ere long the railway will be a profitable investment for capital. When the line of railway on the west coast shall be carried on to Scotland from Lancaster, in conformity with the recommendation of the commissioners appointed by Her Majesty, the Lancaster and Preston will become, what it was always predicted it would one day be, one of the most profitable lines in the kingdom.

Railways in Scotland.—From what little experience we have had in the benefits of railway travelling in this quarter, the line of railway from Glasgow to Ayr appears to come fully up, in the acceleration of trade and business, with any of the other districts in the country, where a railway has been laid down. On the Paisley fast day, notwithstanding that the canal-boats were crowded to suffocation, and that the Paisley steamer, the Renfrew Railway, and Clyde steamers, had their full complement, nearly 4,200 passengers were carried on the line to Glasgow, and to accommodate the applicants, for one run 19 carriages had to be set on. During the first 18 days that the Glasgow and Paisley

line has been open, the number of passengers has been 2,048 per day, or in the course of 18 days a total of 36,864, which is an average for each of the 24 runs per day of 85 passengers and a fraction more. When it is recollected that the canal boats are only calculated to accommodate 70 passengers when full, and that the coaches were only licensed for 14 or 15 passengers, we thus find that though the boats are still pretty well filled, the railway now conveys as many more passengers as could have gone by both conveyances, though they had been crowded on every occasion. It is a singular fact, that thousands and thousands of people who live within 20 miles of Paisley, always regarded it as only a large village, and it is quite amusing to hear the constant marks of surprise uttered by such strangers, when, by the railway, they find themselves, unexpectedly, landed in the centre of a busy population of from 60 to 70,000 persons.

Taff Vale Railway.—We understand, from undoubted authority, that every exertion is now making to open the Taff Vale line as speedily as possible as possible, and that in fact, the carriages will very shortly be ready to convey passengers from Cardiff to Newbridge.

London and Brighton Railway.—The Report of the half-yearly meeting of the proprietors of the London and Brighton Railway will be found to verify, to the fullest extent, all that we then said as to the favourable prospects of this undertaking. Already, we understand, has Southampton experienced, in a manner far exceeding all expectation or even hope, the benefits which railways are calculated to confer upon watering-places. That town has been for many weeks crowded, while the Isle of Wight absolutely swarms with visitors; the hotels (a second has been erected at Shanklin) overflow with guests, and every nook and every corner is crowded. Such has been the effect of the South-Western Railway; but all this, and more than this, must fall, in little less than another twelve months, to the lot of Brighton. The extraordinary success of the Shoreham Branch shows what may be expected when the entire line is complete.

Manchester and Leeds Railway.—The Directors of this railway have for some time past expected to open the line throughout at the close of the present year; but the works at the summit Tunnel being farther advanced than had been calculated upon, it is now fully intended to open early in the month of November.

Belfast and Cavehill Railway.—The works on this line are proceeding rapidly; it is expected that it will be opened by the end of the first week in September. We will then be in advance of Dublin, with two railways for her one.—*Belfast Vindicator.*

Great Western Railway.—The progress of this line becomes a subject of increasing interest in this county. The journey from Gloucester to London will shortly be brought within the compass of four or five hours! Within the memory of persons now living, it took four days to accomplish a journey by coach from this city to the metropolis. —*Gloucester Chronicle.*

MISCELLANEOUS.

Season Tickets for Railways.—Several of the Lines of Railway lead to those places which the metropolitans like to visit for a few weeks or months during the summer. The South Western is the only line now open to its terminus on the coast, and it leads, in a very short time, to those places which are the most desirable, but which were, formerly, too remote for the occasional visits of men of business to their families. By this railway, however, a merchant, after having attended 'Change in London, may reach Southampton, or even the Isle of Wight, comfortably the same evening. This is a great advantage on the part of the promoters of this line; and as nature has given it to them, they should, and with their usual liberality no doubt will, allow the public to participate in it as largely as possible, the more so that every advantage in this way will be mutual and reciprocal, benefitting all parties concerned. It has again and again been suggested to us that they would gratify and serve the public very much, and, at the same time, increase the amount of fares, if they were to sell seasonal tickets to seasonal residents on the south coast and in the island. This would, at the same time, greatly promote the interest of all the places along the coast, and, thus, it would be equally patriotic and profitable. What charge should be made for a seasonal ticket is not for us to determine; but the more moderate it would be the more profitable; and the granting of such tickets would make the company and the line exceedingly popular, both in the Metropolis and all around the South Western terminus.

The Tomb of Napoleon.—The model of the tomb of Napoleon, now erecting by M. Marochetti, under the dome of the Invalides, is composed of a large base, surrounded by columns and bas-reliefs, supporting at the four corners as many statues, one holding the globe, another the sceptre, a third the hand of justice, and the last the imperial crown. Upon this is another base, two-thirds the width and one-half the height of the first, also decorated with bas-reliefs, and having at each angle an eagle with expanded wings. This, again, is surmounted by a pedestal eight feet high, decorated with bas-reliefs, and having in the centre the word Napoleon, upon which is an equestrian statue of the Emperor, wearing the imperial mantle, and having the brows crowned with laurel. The left hand holds the bridle, while the right carries the sceptre of the empire, raised to the height of the head. The two bases and pedestal, which rise to the height of nearly 40 feet, are of wood, and the statues of carton. The equestrian statue is 15 feet high, the eagles six, and the other ornaments in proportion. The effect is exceedingly grand, and worthy of the subject. The execution is expected to occupy M. Marochetti three years.

The Royal George.—By far the most magnificent exhibition which has yet been witnessed of the enormous force of gunpowder, when exploded under water, took place at Spithead on the 5th ultimo. The charge, which consisted of 25 barrels, or 2,250 lbs., was placed at the depth of 11¼ fathoms, or about 70 feet from the surface of the water, nearly over the original position of the fore hatchway of the old ship. When Colonel Paisley's trumpet sounded, and the word was given to "Fire," the whole area was shaken as if by an earthquake, the surface became ruffled like the top of a glacier, and, in the next instance, literally in less than two seconds, the water bulged up and rose to the height of about 20 feet, after which a sort of second burst occurred, which projected the sea in huge masses high into the air. Such was the violence of this effort that the spray was thrown completely over all the adjacent vessels in a drenching shower, accompanied by gusts of wind. The columns of water ascended to the height of from 50 to 100 feet, and the commotion in the water, with the quantity of mud, the number of dead fish, and other symptoms of violence, which spread in every direction, far exceeded the effects of any other explosion of a similar nature.

Canal Boats.—Mr. William Houston, of Johnston Castle, has invented a means of propelling boats, on canals, by the use of the Archimedean Screw, at the rate of twelve miles an hour. Boats for the Glasgow and Paisley Canal, are now in course of construction.—*Scotsman.*

Railway Duty.—The amount of duty paid to Government from twelve of the principal railways in England in the year ending the 5th of January last, was (according to returns laid before the Select Committee) very nearly £60,000. Of that large sum the London and Birmingham Company and Grand Junction Company jointly contributed more than one-half, the former paying £20,350: 2: 1*d.*, and the latter £14,287: 9: 3*d.* The remainder of the amount was made up as follows:—Liverpool and Manchester Railway, £7,991; London and South-Western, £5,459; Great Western, £5,440; London and Greenwich, £2,769; Newcastle and Carlisle, £2,125; North Union, £1,508; Leeds and Selby, £1,233; Manchester, Bolton, and Bury, £1,231; Manchester and Leeds, £1,199; and Newcastle and North Shields, £987. It is to be observed that several of the above lines were but very partially opened during the greater portion of the period embraced in these returns,—for example, the Manchester and Leeds line was not opened at all till the 4th of July, 1839. The amount which they will contribute during the current year will therefore be very much larger. From another return it appears that the proportion which the Government duty bears to the fares of the several Companies is nearly as follows:—London and Birmingham, 1-22nd; Great Western, Liverpool and Manchester, and Manchester and Bolton, 1-17th; Newcastle and Carlisle, 1-14th; North Union, and Manchester and Leeds, 1-13th; and Grand Junction, 1-12th. On one of the Scotch lines (the Monkland and Kirkintilloch), the proportion of the gross receipts from passengers absorbed in the payment of the tax is about 1-6th.

Rapid Travelling.—A gentleman who came passenger in the Royal Mail Steam-ship Britannia from Boston, travelled between the 18th of July and the 14th instant, by canal, stage, railroad, and steamboat, not less than 5,921 miles, or at the rate of 219¼ miles per day.

Roman Antiquities.—By digging in a cellar at Strasburgh, there have been lately discovered Roman slabs, of a very fine red earth, some of about 16 inches square, and others of about 8 inches; all bearing the inscription, "Eight Augustan legion." There were also discovered fragments of a magnificent Etruscan vase, 3 feet in height, with bas-reliefs of admirable workmanship, and one of about half the size, containing ashes. Farther excavations are being carried on; and the result has been, that a vault supported by pilasters has been found, and other valuable evidences will no doubt be brought to light.

Animal Heat.—Dutrochet has found that the temperature of the frog in the open air is 1° C. lower than that of the atmosphere, but that when immersed in water, its temperature is ·03 to ·05 C. higher than the surrounding air. The temperature of the grey lizard was ·18° lower than that of the atmosphere; that of the carp when in water is the same as that of the liquid. The leech and snail are colder than the atmosphere.—*Athenæum.*

Maximum Density of Water.—The temperature at which water assumes its greatest density has been fixed by Muncke, at 39°·05; by

Stampfer, at 38°·82; by Hällstroem, at 39°·25; more lately, Despretz has fixed this point at 39°·20; the mean of all these is 39°·08: so that perhaps 39°, the number obtained by Crichton, may be taken as the true temperature.—*Ibid.*

Coal on the Black Sea.—A coal mine is said to have been discovered at Penderaclia, one of the finest ports on the Black Sea, belonging to the Turkish empire. A steamer was sent from Constantinople, in order to examine the locality, and bring back some specimens of the coal, which it did, besides using the same on her return for the purpose of heating her boilers.—*Ibid.*

Island of Formosa.—From some extracts from a Chinese work read at the French Academy, by M. S. Julien, it appears that there are two volcanoes towards the eastern part of this island; a boiling spring from which an inflammable gas issues,—the boiling appearance being probably produced by the evolution of the gas; a muddy river and springs; a mountain of sulphur, and a bridge of iron wire, which crosses the river Khichoui-Khi (rapid river).—*Ibid.*

Draining the Haarlem Lake.—M. Dietz, the Dutch engineer, has invented a machine, which it is supposed will be adopted for this purpose, and by means of which he calculates that 100,000 cubic ells of water may be drained off daily. He estimates the body of water in the Haarlem Sea at 770,000,000 cubic feet, to empty which it would require ten of his machines of 30-horse power each: the quantity drained off by them daily would be about 1,000,000 cubic feet, for a period of 800 days. The estimated expenditure of this work is as follows:—

Ten machines, at 30,000 florins each	300,000
Coals, &c., 500 florins per diem, for 800 days.....	400,000
Sixty workmen, at 1½*f.* each, per diem, for 800 days.....	72,000
Superintendence, plans, &c.	25,000
	797,000

About £66,416

The Dover Iron Steamer.—This vessel made her passage from Liverpool to Plymouth (where she called for coals), in 39 hours, and from Plymouth to Dover in 24½ hours, the total distance ran being upwards of 600 miles. The Archimedes started with her from Plymouth, and, though there was a heavy sea, and a fair wind, the Dover arrived at Dover 2½ hours before the Archimedes. This trial is very satisfactory, as the Archimedes is known to be a superior vessel, and more particularly so with a fair or beam wind, from the quantity of canvas she sets, and the advantage she possesses in having no projecting paddle-boxes.

New Engine of War.—M. Billot has invented a machine which discharges 2,000 balls, of half a pound each, every minute, or 120,000 per hour, without cessation. Its action may be continued or arrested at the will of the party in charge of it. The discharge takes place at four different points, and may be directed at as many objects, or united against one. The machine weighs about 85 lbs., and its range is about 3,280 feet; but, if one were constructed of about 1½ cwt., its range would be quadrupled. The use of the machine does not depend upon gunpowder, air, or steam, as a moving power.

LIST OF PATENTS.

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(SIX MONTHS FOR ENROLMENT.)

John Louis Bachelard, of St. Martin's-lane, gentleman, for "improvements in the manufacture of beds, mattrasses, chairs, sofas, cushions, pads, and other articles of a similar nature," being a communication.—Sealed July 30.

Felix Troubat, of Mark-lane, London, merchant, for "improvements in the manufacture of vinegar."—Sealed August 1.

William Daubney Holmes, of Lambeth-square, Surrey, civil engineer, for "certain improvements in steam engines, and in generating and applying steam as motive power."—Sealed August 1.

Thomas Barnabas Dalt, of Birmingham, gentleman, for "improvements in inkstands or inkholders."—Sealed August 1.

James Taaffe, of Shaw-street, Dublin, slater and builder, for "improvements in roofing and slating houses and other buildings."—Sealed August 1.

James Hodgson, of Liverpool, engineer, for "a new mode of combining and applying machinery for the purpose of cutting and planing wood so as to produce plain or moulded surfaces."—Sealed August 3.

John Sanders and William Williams, of Bedford, iron founders, and Samuel Lawrence Taylor, of Old Warden, in Bedford, aforesaid, machine maker, for "improvements in ploughs."—Sealed August 3.

George Edward Noon, of High Holborn, engineer, for "improvements in pumps and in engines for drawing beer, cyder, and other fluids." Sealed August 3.

William Saunders, of China-terrace, Lambeth, chemist, for "certain improvements in paving streets, roads, and ways."—Sealed August 3.

William Beetson, of Brick-lane, Old-street, brass founder, for "improvements in water closets and stuffing boxes, applicable to pumps and cocks."—Sealed August 5.

Colin Macrae, of Cornhill, Perthshire, gentleman, for "improvements in rotary engines worked by steam, smoke, gases, or heated air, and in the mode of applying such engines to useful purposes," being a communication.—Sealed August 5.

Theophilus Richards, of Birmingham, merchant, for "certain improvements in cutting or sawing wood," being a communication.—Sealed August 5.

Henry Trewhitt, of Newcastle-on-Tyne, esq., for "improvements in applying the power of steam engines to paddle shafts used in propelling vessels," being a communication.—Sealed August 7.

Robert Stirling Newall, of Dundee, gentleman, for "improvements in wire ropes, and in machinery for making such ropes," being partly a communication.—Sealed August 7.

Andrew Smith, of Princes-street, Leicester-square, engineer, for "certain improvements in carriage wheels, rails, and chairs for railways."—Sealed August 7.

Thomas John Davis, of 5, Bloomsbury-square, esq., for "certain improvements in the form and combination of blocks of such materials as are now used or hereafter may be used in building, or for paving public and private roads and court yards, or public and private causeways and subways, or any other purposes to which the said form and combination of blocks may be applied."—Sealed August 8.

Downes Edwards, of Surbiton-hill, Kingston, farmer, for "improvements in preserving potatoes and other vegetable substances."—Sealed August 8.

John Isaac Hawkins, of College-place, Camden-town, civil-engineer, for "an improvement or improvements in buttons, and in the modes of affixing them to clothes," being a communication.—Sealed August 8.

Francis William Gerish, of East-road, City-road, ironmonger, for "improvements in apparatus to be used as a fire-escape, also applicable to other purposes where ladders are used."—Sealed August 8.

Samuel Howard, of Manchester, engineer, for "certain improvements in boilers and furnaces."—Sealed August 8.—2 months.

Barard Charles Wetterstedt, of Limehouse, for "improvements in preserving vegetable, animal, and other substances, from ignition and decay."—Sealed August 11.

John Peter Tsaie Poncy, of Wells-street, Oxford-street, watch-dealer, for "improvements in clocks and chronometers," being a communication.—Sealed August 13.

Miles Berry, of Chancery-lane, patent agent, for "certain improvements in the arrangement, construction, and mode of applying certain apparatus for propelling ships and other vessels," being a communication.—Sealed August 14.

Pierre Armand le Comte de Fontainemoreau, of Skinners-place, Size-lane, gentleman, for "certain improvements in covering and coating metals and alloys of metals."—Sealed August 15.

Luke Hebert, of Birmingham, civil-engineer, for "certain improvements in the manufacture of needles."—Sealed August 17.

John Young, of Wolverhampton, Stafford, iron-master, for "improvements in the manufacture or construction of knobs, handles, frames, tablets, boxes, and other ornamental articles applicable to the decoration of houses and domestic furniture."—Sealed August 17.

Thomas Robinson Williams, of Cheapside, London, gentleman, for "certain improvements in measuring the velocities with which ships or other vessels or bodies move in fluids, and also for ascertaining the velocities of fluids in motion."—Sealed August 27.

Benjamin Hick, junior, of Bolton le Moors, Lancaster, engineer, for "certain improvements in regulators, or governors for regulating or adjusting the speed or rotary motion of steam engines, water wheels, and other machinery."—Sealed August 27.

Henry Waterton, of Fulmer Place, Gerard's Cross, Buckingham, esq., for "improvements in the manufacture of sal ammoniac."—Sealed August 27.

Joseph Lockett, of Manchester, engineer, for "certain improvements in manufacturing, preparing, and engraving cylinders, rollers, or other surfaces for printing or embossing calicoes, or other fabrics."—Sealed August 27.

Charles Smith, of Exeter, builder, for "improvements in the manufacture of lime and cements, or compositions."—Sealed August 27.

William Church, of Birmingham, civil engineer, for "improvements in fastenings applicable to wearing apparel, and in apparatus for making the same and like articles, and also in the method or methods of preparing the said articles for sale.—Sealed August 27.

Hugh Unsworth, of Blackwood, Lancaster, bleacher, for "certain improvements in machinery or apparatus for mangling, drying, damping, and finishing woven goods or fabrics."—Sealed August 27.